ELECTRICAL WEST

A McGRAW-HILL PUBLICATION

February 1960
50 Cents

1960 STATISTICAL ISSUE

- A review of 1959
- Detailed plans for 1960
- Major projects through 1965

Here's a new idea to help you sell electric heat

Electric heating promises to be the electric industry's biggest load builder in the next decade. Advancements in insulation and equipment now make it practical and efficient for any climate.

For the many utilities aggressively promoting electric heating, here's important news: To assist and tie-in with the big job of selling electric heat, Kuhlman offers a new dramatic symbol—a gold transformer to identify electric heating and the all-electric, gold Medallion Home.

The Kuhlman Gold Transformer program ties right into the industry's great drive for electric home heating. It will establish a bright, attractive, easily-recognized symbol that will get the public's attention and approval.

It's backed by a *selling* campaign, with advertising, sales promotion and sales helps to back up the Gold Transformer as a symbol for electric heat.

The Kuhlman representative in your area has all the details you'll want. Call him now!

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KUHLMAN ELECTRIC COMPANY, Birmingham, Michigan

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LOOK FOR THE GOLD TRANSFORMER, SIGN OF ELECTRICALLY-HEATED HOMES

editorial views EW

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Statistics — In this issue, the editors report numerically the progress of the electrical industry during the past year. Statistics in themselves can be very sterile unless one looks behind them to visualize the years of planning, the man-hours of engineering, the hard-hitting selling and the over-all teamwork which bring them about. Even more exciting is the visualization of the dramatic growth that lies ahead as promised by a year-to-year study of the Western electrical industry's travels down the road of public service.

Later on this year, the editors intend to project this record of past accomplishments into a forecast of things to come. Already enough preliminary work has been done to assure that this picture of the future will be exciting, challenging and the source of some sober reflections about the magnitude of the job ahead. But aside from all that, the figures and charts provided herewith are important in themselves. They are a yardstick for the marketing man, a foundation for the system planner and, above all, an inspiration to all who have committed themselves to a career in the electrical industry of the West.

—EW—

Fireworks Ahead— With Congress convening in an election year, all kinds of shenanigans can be expected as both parties jockey for issues. As usual, business, and big business in particular, is likely to be the whipping boy for politicians bent on seeking the votes of the so-called "common man." It is quite possible that the electrical business will not escape the probes of those who seek material for campaign speeches.

The present investigation of the Federal Grand Jury into industry pricing policies probably stems from a certain senator's resentment over manufacturers quoting book prices to TVA. The Treasury Department probably never would have thought of questioning certain utility advertising were it not for the fact that other politicians thought this might make a good issue with which to arouse the electorate. In the same category falls the efforts to whip up a controversy over the national federal power grid. Harassing as this may be, it's part of the democratic system. Behind all the smoke of political activity is a hard core of facts. The fact is that the electrical industry, by and large, can proudly "stand on its record."

—EW—

Trained Manpower for the '60s— Instead of deploring and fighting against automation in business and industry, labor unions and social planners would do much better for themselves and their followers if they spent all of such wasted energy constructively in stimulating the training of more and more people in the skills necessary to operate, service and maintain the machines they fear. Only by such contribution toward making them more productive can the wage and living standard levels they fear losing be enhanced or even continued. It has been the productivity of the machines that has increased the productivity of the worker so far and brought present incomes into possibility. To increase such income still more will require making the machines still more productive. The '60s will be demanding an ever-increasing number of trained people, even if the demand for hard manual toil is reduced. The challenge of the new decade is one of skill and science.

TRANSFORMERS

For the Electric Power Industry

Just Published—A practical manual on electric power transformer design, construction, application, operation, and maintenance. Includes up-to-date reference data, plus new material on the economics of design and application. Also covers recent advances in methods of temperature calculation; testing techniques; estimation of eddy and stray losses; gauging the transformer's life span; insulation materials and methods; fault detection . . . ***and more.*** **By R. L. Bean; N. Chackan, Jr.; H. R. Moore; and E. C. Wentz—all Westinghouse Electric Corp. 426 pp., 277 illus., $12.50**

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The Cover—Model of Ben French station for Black Hills Power & Light Co., Rapid City, S. D. First unit of multiple unit plant now under construction. Project designed, engineered and being constructed by Stearns-Roger Mfg. Co. Model built by Stearns-Roger for design development.

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Electrical West (with which is consolidated The Journal of Electricity), February 1960, Vol. 124, No. 2. Published semimonthly except November when published trimonthly by McGraw-Hill Company of California, James H. McGraw (1860-1948) Founder. Office of publication, 235 N.W. Park Ave., Portland 9, Ore. See panel below for directions regarding subscriptions or change of address.

Executive, editorial, circulation and advertising offices: 68 Post St., San Francisco 4, Calif. Donald C. McGraw, chairman of the board; George C. Tenney, president; John W. Otterson, vice-president; Thomas H. Carmody, secretary and treasurer.

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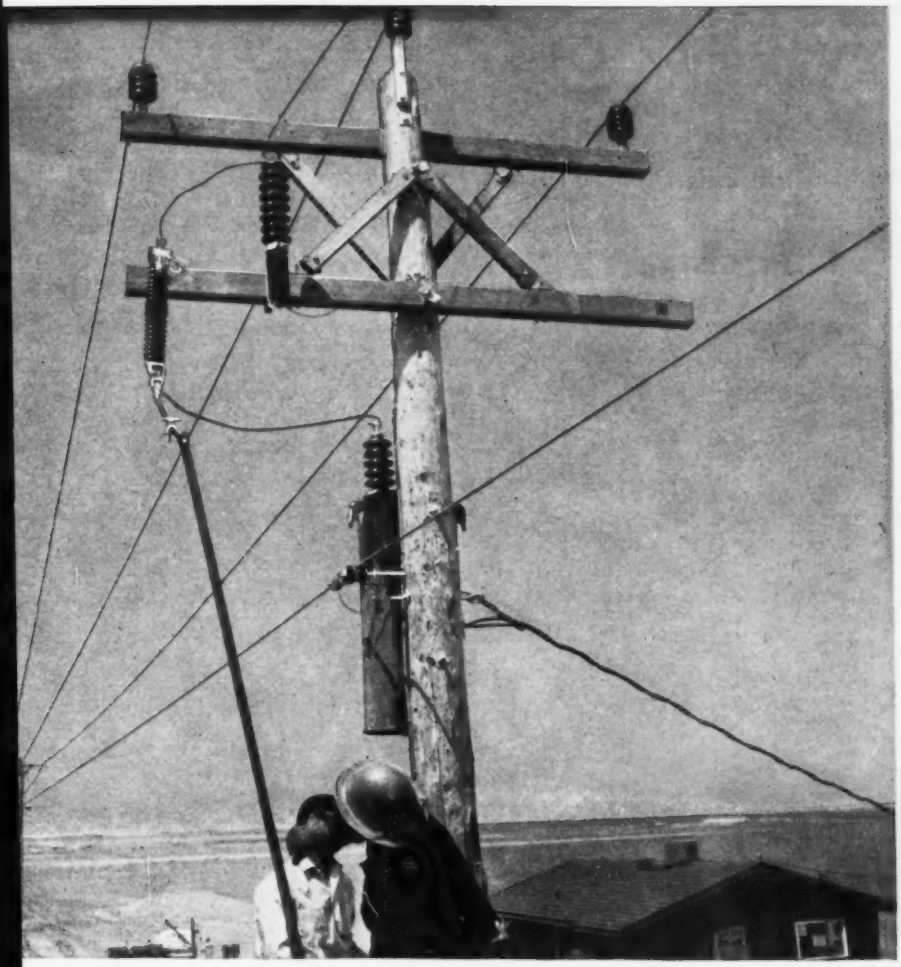
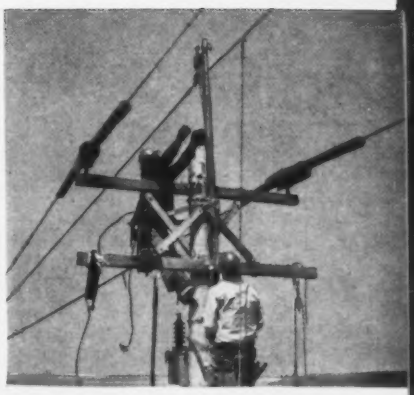
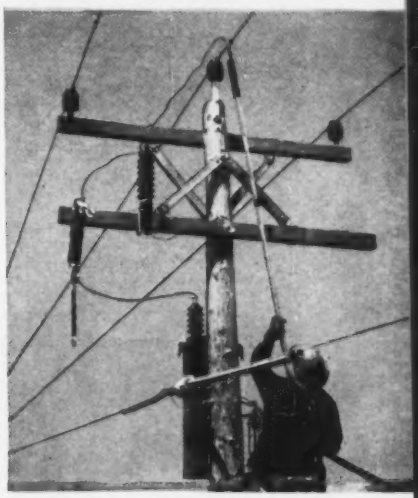


L-M 27 KV TYPE HDO fuse cutout and Type SS arrester protect this 20 kv Round-Wound transformer.



IT IS PRACTICAL to work 20/34.5 kv distribution lines hot, when proper safety procedures such as these are followed.



WITH JOB COMPLETED, hot line clamps are tightened in place prior to removal of protective line hose.

daho Power Company Uses L-M Equipment or 20/34.5 kv to 240/120 Volt Service Drop

Idaho Power Company has overcome the problems posed by great distances and low population density, through installation of a three-phase, four wire, 34,500 volt grounded wye distribution line. This system eliminates the need of all subtransmission and has fewer substations, less regulating equipment and higher feeder loading, resulting in lower cost per kva of installed capacity. It has proved most economical in distributing power along the 275 miles of isolated farm land.

L-M has cooperated with progressive Idaho Power through research and development of apparatus and construction materials to make this economical distribution voltage practical. All products for the 150 kv BIL system are available from L-M—switching equipment, porcelain insulators, capacitors, cutouts, lightning arresters, reclosers and Round-Wound® transformers.

Get Complete Information.

L-M offers a compilation of data on the design and operation of 20/34.5 distribution. Ask your L-M field engineer for these papers, or write Line Material Industries, Milwaukee 1, Wisconsin.

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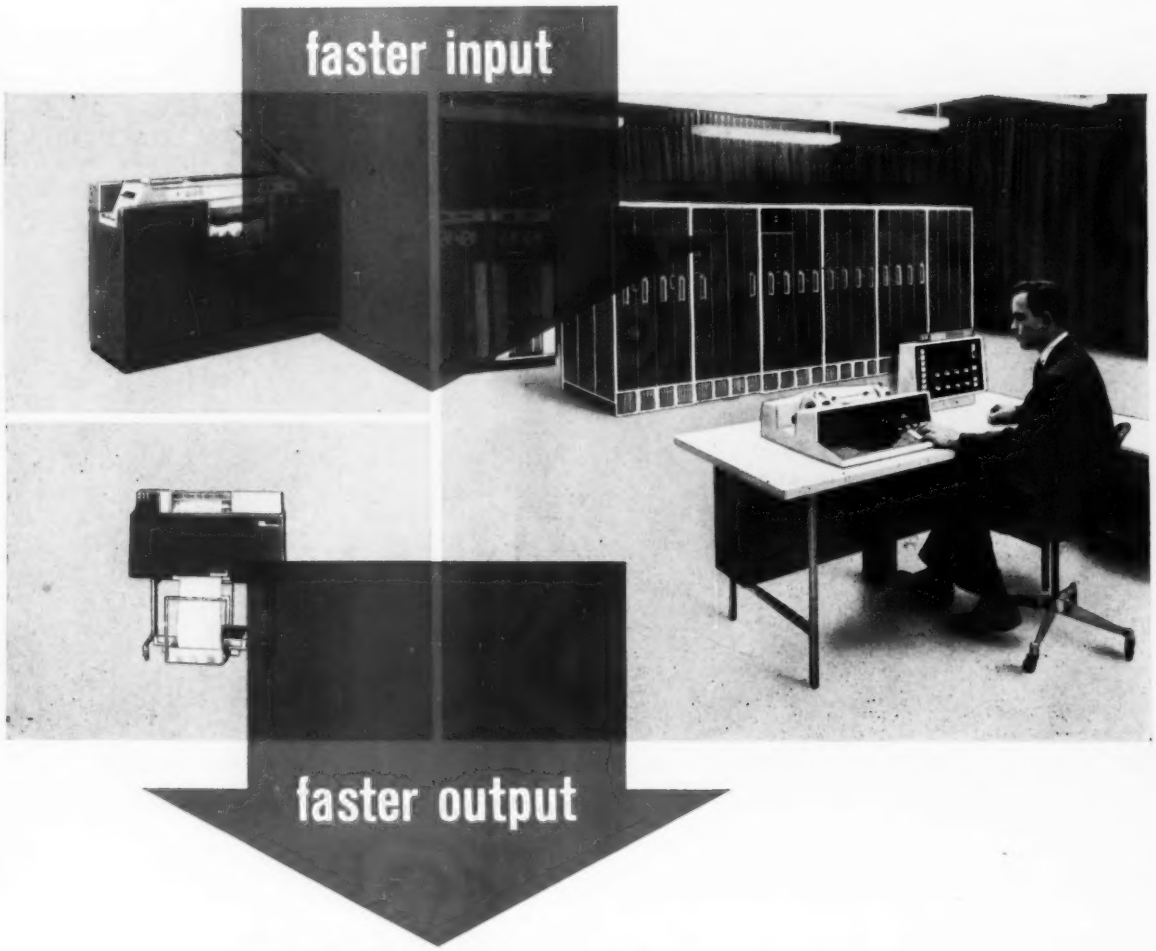

... the powerful IBM 7070 now packs even greater processing power

Greater flexibility in putting your problem on computer . . . greater speed in taking results off . . . greater flexibility in handling peripheral operations—these are the features that IBM's exciting new 1401 System brings to the IBM 7070. The 1401 balances input/output speeds to match the tremendous processing speed of the 7070, adds powerful off-line editing and programming facilities to free the computer for more profitable work. The total system—designated the tape-oriented IBM 7070—gives you lower job cost . . . more production per dollar.

The tape-oriented 7070 employs the 1401 System to boost card-to-tape conversion from 500 to 800 cards a minute. The 1401 also features an exclusive horizontal chain printer that turns out crisp, perfectly aligned copy at 600 lines a minute. This unique printer moves paper at magnetic tape speeds—up to three and a half times faster than conventional printers!

With these advances comes unusual flexibility. The tape-oriented IBM 7070 is a solid state, high-capacity system. It can be expanded from a single-channel 4-tape to a four-channel 40-tape system. It can read on one to four channels simultaneously with computing. And in keeping with IBM's concept of Balanced Data Processing, the 7070 is linked with comprehensive services ranging from personnel education and program planning through reliable service engineering.

For full information on the new tape-oriented 7070 call your IBM representative. Like all IBM equipment, the 7070 System may be either purchased or leased.

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EW news roundup

New TV camera tube permits stored pictures, which remain on screen as long as an hour

STORED PICTURES — This multiple exposure shows how a new Westinghouse TV camera "memorizes what it sees." The young woman in this picture stood before a television camera for a split-second exposure, then walked around to see her image frozen on the receiver screen. Called Permachon, the new camera tube operates as an electronic film. The picture is stored by a special photoconductor on the faceplate, which is scanned after exposure by an electron beam to transfer the image to a conventional picture screen. Stored pictures will remain on the screen as long as one hour for study or photographing. A potential use for the utility industry is in telemetering, using industrial TV and microwave.

—EW—

YOU CAN'T BEAT IT — Electric house heating, always the best method, has achieved recognition finally, despite years of striving for it, and there will be the first National Electric House Heating Exposition soon—in Chicago at the Sherman, March 21-23. It is sponsored by the Electric House Heating Equipment Section of National Electrical Manufacturers Assn. Several Western manufacturers of such equipment will be among the 50 exhibitors of all types of heaters, controls and insulation. "You Can't Beat Electric Heat" is certainly a fighting slogan.

—EW—

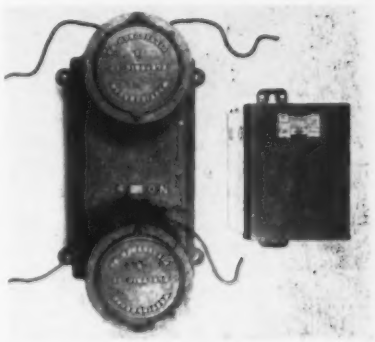
Has the North Pole been declared surplus? This question came to mind when the U. S. Army Engineers asked for bidders on some surplus poles, 40 ft in length, from its North Pole Alaska Communication Station. Bidders, however, were not required to mush on to the Pole to put in their bids, even if they may have to pick up their purchase, for the Anchorage office of the Engineers District was where they were to be sent by Jan. 18.

—EW—

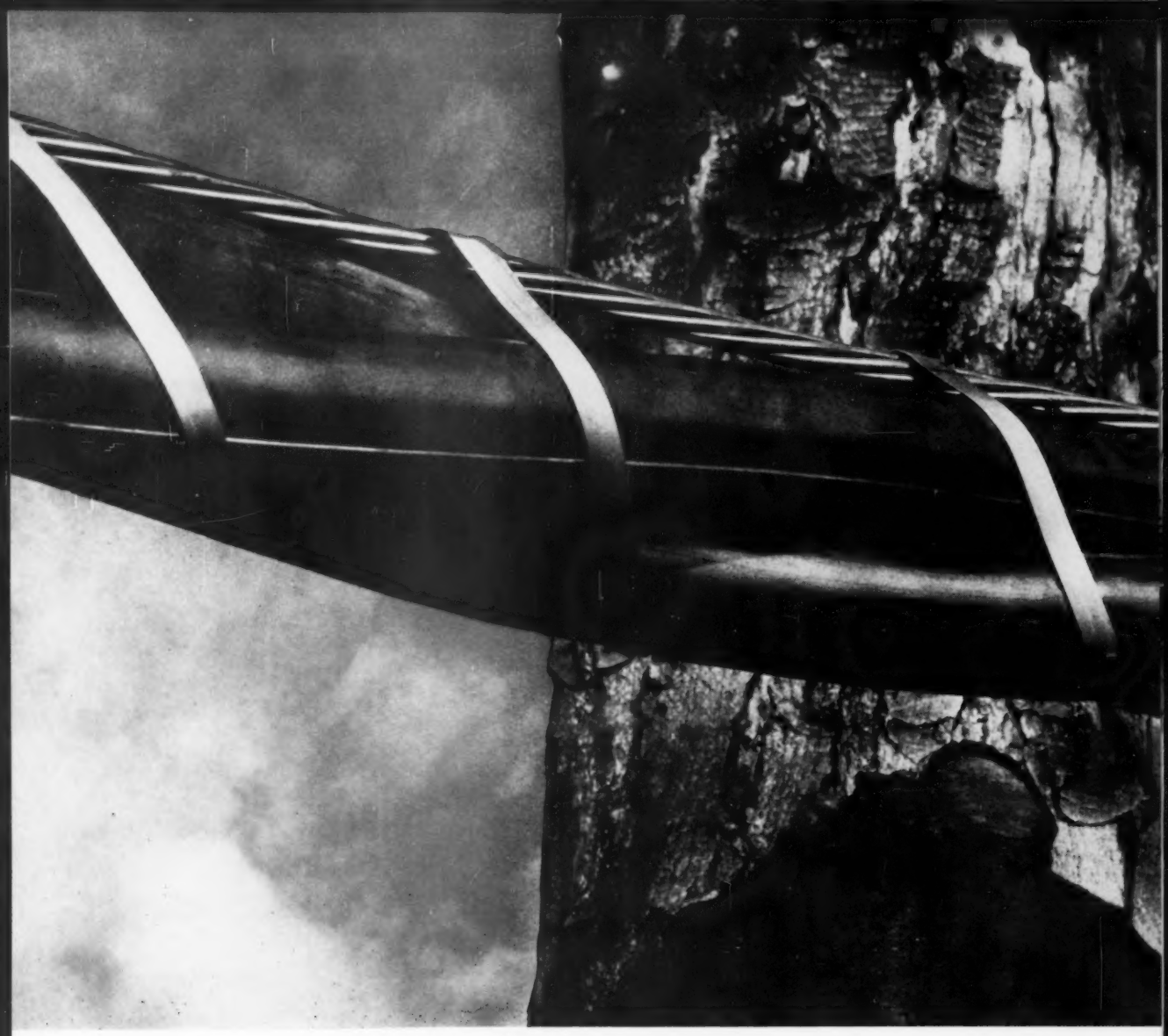
COSTLY — Utah's strike at the Kennecott Copper Corp. cost the community over $50,000,000, at the rate of $338,187 per day and was in its 154th day before it was settled. The company published these figures in a full-page ad when four of the 40 separate local unions still held out for special treatment after peace had been signed with all the others. One of the locals was IBEW 1081, with only 174 workers. Besides what Utah lost, the nation also lost in a raise in base price of copper. No wonder the various copper companies have established a joint advertising and promotion campaign to try to regain some of their lost market, one that aluminum as well as foreign producers have moved in upon.

—EW—

"FIX" — A by-product of television has been a shot in the arm for the motion picture industry rather than a *coup de grace*. The Los Angeles Department of Water & Power reports that studios are busier than ever before. Columbia Pictures has 24 sound stages in use, with one of its subsidiaries using facilities to produce seven TV series. Paramount has three television series in production; Twentieth Century has four television series on the stages and six waiting. Warner Brothers, with 23 sound stages, is producing 10 television series. All major studios also have heavy major film production schedules. It is a shot in the arm for the Los Angeles economy, too.



Recently tested by Westinghouse engineers at Sharon, Pa., was this 1892 dry-type transformer rated at 2 kw of a 2,000/1,000-v primary and a 100/50-v secondary. It served a church in Minnesota for 48 years and, although retired since 1940, still performs perfectly. At the left is a modern 3-kva compound-filled transformer



Blaze a smaller path!

Running a power line through a dense tree area can be a costly job!

With open-wire systems, the path you clear must be a broad one. Otherwise extra-long poles are necessary. Either way costs you plenty.

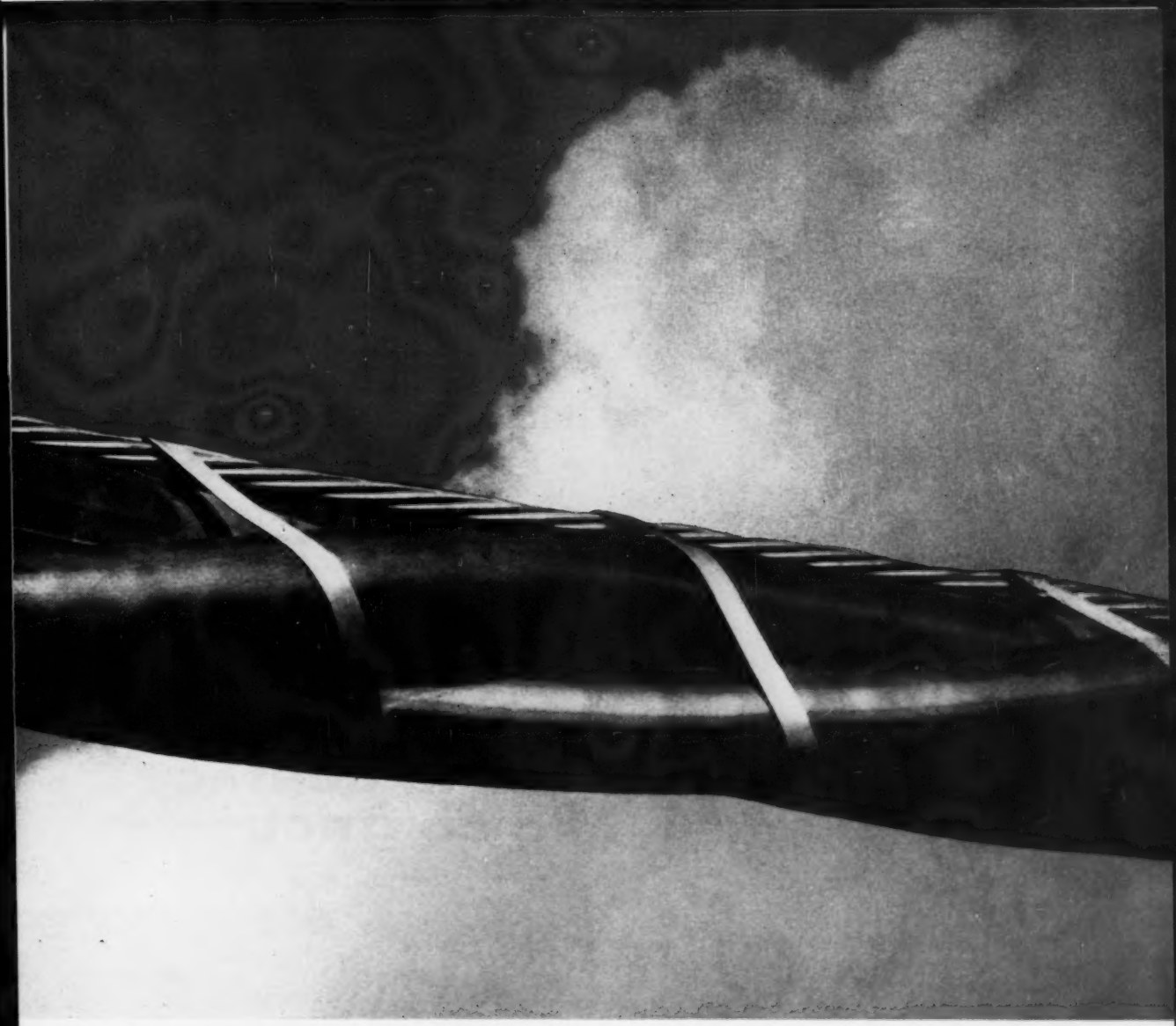
With Rome's reverse-lay preassembled aerial power cable, less tree clearance is required, so you do less tree trimming—initially *and* periodically. Rome aerial cable has a built-in, high-strength messenger for staunch support—capable of supporting falling branches and even trees.

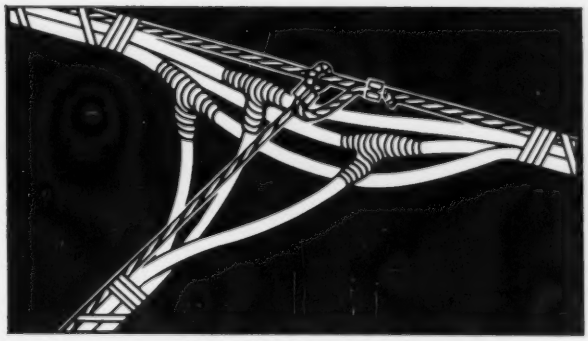
For instance—you need not clear as much of a right of way *initially* as you would for open-wire systems. And you can put off *periodic* tree trimming for as long as five years, compared to the normal two-year requirement for open-wire systems.

Because each conductor is fully insulated and jacketed for maximum resistance to moisture and tree abrasion, reverse-lay aerial cable reduces the chance of outages during storms and high winds. There's no chance that wet branches will cause shorting between phases. And it's safer for your line crews to handle during storms . . . safer for the public too!

In residential areas, preassembled aerial cable gives you two *more* advantages. You avoid situations in which the public might feel you are "defacing" property by excessive tree trimming. And, because it's compact, aerial cable makes a neat, uncluttered appearance—less likely to bring complaints.

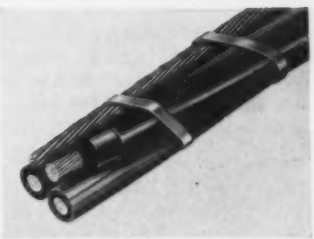
You can get Rome's preassembled reverse-lay aerial power cable in a wide range of constructions, rated up to 15 KV: Rozone (oil-base) or Rozone A (butyl-base) insulation, Roprene (polychloroprene) or Roseal (flame-retardant polyethylene) jacketing. Mail the coupon, now!





Ease of tapping Long spans sometimes make mid-span tapping necessary. Rome's reverse-lay preassembled aerial cable construction—where the direction of lay of conductors is reversed at regular intervals along the line—permits easy mid-span tapping. The reversed portions provide sufficient "slack" for taps *anywhere* along the line! This eliminates the necessity of making taps at the pole ends only. Stress is carried entirely on the messenger. Conductors can be untwisted for tapping without cutting—even while the line is hot! Your linemen can use wire guards and rubber blankets for safety and make pole-end taps without use of a platform.

Better voltage regulation Because of its close geometric spacing as compared with open-wire circuits, aerial cable has a lower reactance. Voltage drop is about half as great as typical crossarm construction and, for a given voltage drop, power can be transmitted twice as far.



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DIVISION OF **ALCOA**

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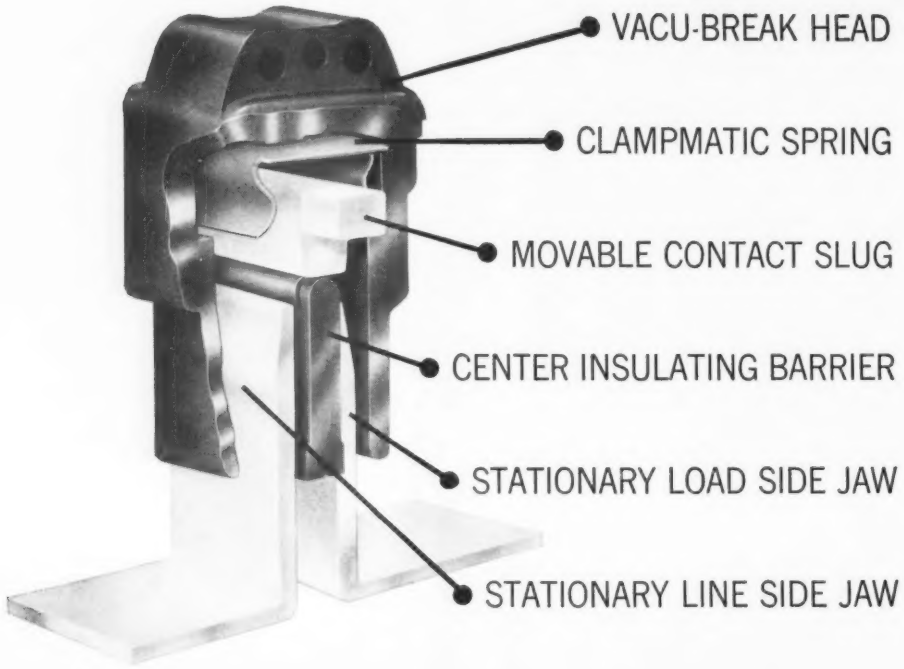

INCREASE SAFETY SWITCH LIFE WITH CLAMPED PRESSURE CONTACT AND VACU-BREAK ARC CONTROL

Your customers get longer switch life from BullDog safety switches, thanks to unique BullDog design. The high-tension Clampmatic® spring puts pressure where it belongs—on contact faces after the switch is "ON." Clamped pressure action assures good electrical contact for the life of the switch. It means the switch lasts longer, too, for there's no overheating to damage switch components. In switching "OFF," the pressure's removed before the "break" . . . providing true quick-break action.

Vacu-Break® design is another reason BullDog safety switches last longer. Switching contacts are completely enclosed in the Vacu-Break head. Arcs are restricted, starved of oxygen, cooled and smothered quickly. In addition, Vacu-Break *double*-breaks the circuit, effectively reducing the arc length and arcing time.

Vacu-Break arc control plus clamped pressure contacts add up to long switch life . . . and dependable, economical service for your customers. You'll find BullDog safety switches need little or no maintenance over years of heavy-duty use. See your BullDog products distributor.

FOR SAFETY'S SAKE—BUY VACU-BREAK!

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I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

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Consult the following Pacific Coast representatives:

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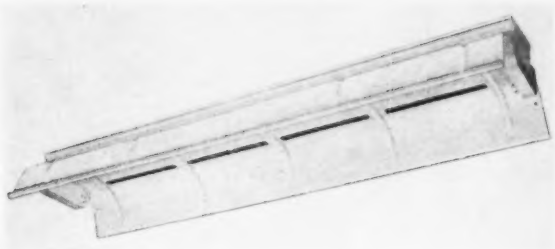
Safety Switchboard Company
910-89th Avenue
Oakland 21, California

Young Electric & Mfg. Co.
2134 Curtis St.
Denver 2, Colorado

BullDog Elec. Prod. Co. of Los Angeles
2885 E. Washington Blvd.
Los Angeles 23, California

PRODUCT NEWS

New Designs and Applications



F Fixture

(1) *Smoot-Holman Co., 321 N. Eucalyptus Ave., Inglewood 3, Calif.*

This Mark V Industro-lux contoured luminaire features a ribbed reflector, with heavy die-formed ribs every 48 in.; is exceptionally strong and rigid, the manufacturer says. When hung in continuous rows, uniformity of the reflectors assures straight, even rows, it is pointed out. A wide selection of mounting accessories of the gripper type is available.

The new reflector has an all-white porcelain finish. Reflectance is more than 85%, according to the manufacturer.

Metal-clad Switchgear

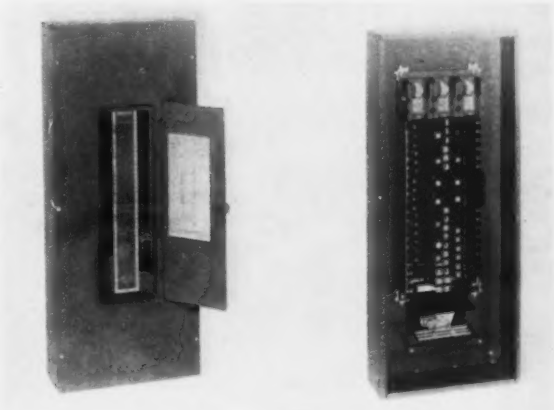
(2) *S&C Electric Co., 4425 N. Ravenswood Ave., Chicago 40, Ill.*

A new line of high-voltage fused load interrupter metal-clad switchgear rated as high as 44,500-amp fault-closing and 500-mva short-circuit interrupting at 14.4 kv has been introduced by S&C. Corresponding ratings at 4.16 kv are 60,000-amp fault-closing and 250-mva short-circuit interrupting.

Closing on 44,500-amp faults is made possible by a new load interrupter with an integral quick-make, quick-break device for high-speed closing. Closing action is sequenced so that the circuit is made on separate arcing contacts before the load-carrying contacts close.

Interrupting duty to 500 mva is provided by a new solid-material boric-acid power fuse. New multiple-bore construction permits the fuse to handle low, medium and high faults. An expellable boric acid liner automatically enlarges the fuse bore to handle the heaviest faults, it is stated.

This new line of switchgear is said to offer important savings for high-voltage power distribution in industrial plants, institutions and commercial buildings. It is available in ratings from 4.8 kv through 14.4 kv. Generally applied as switching centers and service entrance equipment, it is available in continuous ratings of 200, 400 and 600 amp, fused. Ratings as high as 1,200 amp are available unfused.



Stab-Lok Line Extended

(3) *Federal Pacific Electric Co., 50 Paris St., Newark 1, N. J.*

A Stab-lok load center that extends that line of enclosures and breakers into commercial and industrial applications is claimed to permit use of Stab-lok in place of more expensive ABH panels and E-frame breakers for applications requiring up to 400-amp mains.

This extension into the commercial and industrial field is made possible by an exclusive double bus design that increases circuit capacity, the manufacturer states. By having four (instead of two) rows of breaker plug-in slots, the new load center permits 100-amp breakers to be mounted opposite each other. Thus, with only a 1-in. increase in panel width, capacity is doubled for 100-amp circuits.

Space for 28 to 42 circuits is allowed in the load centers, which are available both in single phase and three phase. By the proper combination of the panels and Stab-lok 1-, 2- and 3-pole breakers, power panel applications up to 400-amp mains, 240 v, and branches of 100 amp can be met. Stab-lok breakers have the same interrupting capacity as E-frame breakers and meet the same Underwriters' Laboratories tests, it is stated.

The new load centers have modular construction.

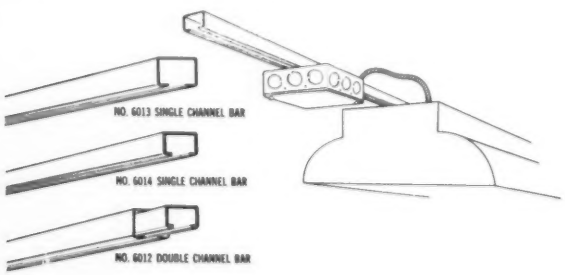
Regulator

(4) *Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.*

Lighter weight and reduced size are among user benefits of its redesigned single-phase JFR regulators, Allis-Chalmers reports. Reduced weight and added convenience are claimed for this new line of 5/8% step regulators.

Weight of the new unit is up to 40% less while the height is reduced as much as 30%, according to the manufacturer, who states that contributing factors are the newly designed wound core, preventive autotransformer, potential and current transformers and rearrangement of internal connections to obtain better space factor.

Operating convenience is increased by a redesigned position indicator with an electrical reset of the drag hands. The position indicator is mounted below the cover for increased operator safety.



Channel Bar

(5) *Steel City Electric Co., Pittsburgh, Pa.*

This all-purpose channel bar is especially suited to suspended ceiling construction for the simplified hanging of box units, fixtures and conduits, its manufacturer states. It is designed with a slotted opening that accommodates and permits easy positioning of the channel carriers, box fasteners, conduit clamps or a simple ¼-in. square nut and threaded rod.

It comes in two sizes. The larger size (catalog No. 6013) is .388-in. deep with an inside width of .576 in.; the smaller channel (catalog No. 6014) has a depth of .263 in. and an inside width of .451 in. The channels are also available as a double bar assembly (catalog No. 6012) with the smaller channel inside the larger. Both channels have a continuous slot opening of .281 in.

In conventional applications the channel bar is supported on runs of the ceiling-carrying channel system or directly from bar joint or ceiling beams. It is installed slot side down and positioned according to electrical layout requirements.

When used as a double bar assembly, the smaller channel within the larger provides added strength for heavier load bearing and greater deflection-resistant capacities, the manufacturer states.

Compression Tool

(6) *A. B. Chance Co., Centralia, Mo.*

This company now offers a CO_2-powered, one-hand-operated compression tool for service taps and service-entrance connections. Jaws of the tool are activated by a lever tripped with the thumb of the tool-holding hand. This leaves one hand free to position the conductor and the compression sleeve. Nine tons of pressure are applied with each crimp. Power is furnished by carbon dioxide gas, stored in liquid form in a cylinder that screws into the handle of the tool. Over 50 crimps can be made with a single cylinder.

Flexible Epoxy Resin Tape

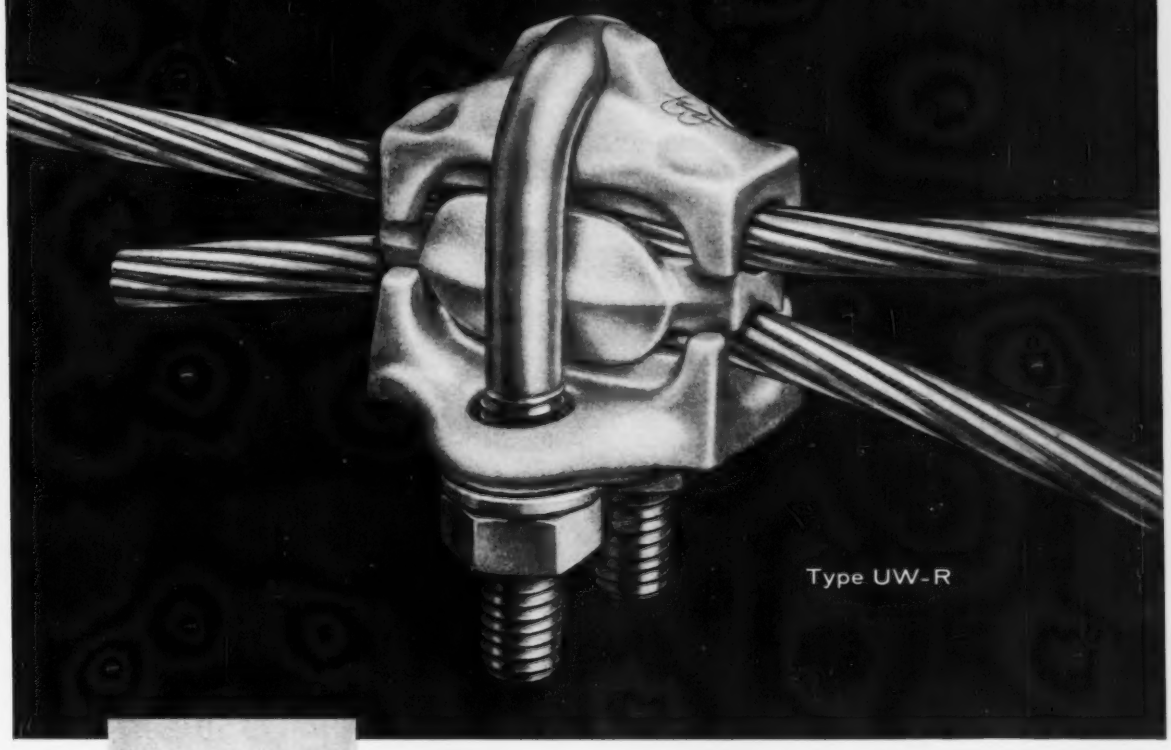
(7) *Minnesota Mining & Mfg. Co., 900 Bush Ave., St. Paul 6, Minn.*

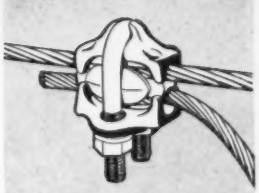
A new electrical tape is described by the manufacturer as the first pressure-sensitive, fully cured flexible epoxy tape on the market. Called Scotch brand electrical tape No. X-1099, the tape is the first of a new line of products based on new techniques. The tape has a backing of fully cured, flexible, 100% solids epoxy resin reinforced with a .002-in. glass cloth.

Because of its high resistance to cold flow, good conformability, high electric strength and good physical properties, the new tape is recommended for applications that require the electric strength of a continuous film of epoxy resin and the physical strength of glass cloth at class F operating temperatures, the manufacturer states.

CLIPIT

low cost DEADEND for ACSR and Aluminum





Generous wrap-around CLIPIT spacer, coated with corrosion inhibiting compound, assures good conductivity when using CLIPIT as a tap connector

The high strength aluminum alloy CLIPIT deadend offers low cost, easy installation, wide range and versatility.
For reliable field performance, the CLIPIT, type UW-R, has these engineered features:

- Wide cable range: 2 sizes cover #6 thru 2/0 aluminum or 1/0 ACSR.
- High holding strength—CLIPITS exceed rated breaking strength of ACSR on most sizes.
- All parts of the CLIPIT are mutually self aligning.
- Captured, high strength, galvanized steel U-bolt permits high tightening torque.
- Wide belled cable entrances of CLIPIT reduce stress points and minimize cold flow. Ears of caps confine cables, prevent splaying.

CLIPIT— *another engineered solution to your connector problems by*

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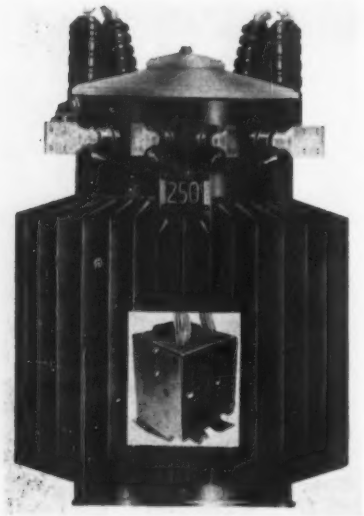


Breaker

(8) *Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.*

A new electrically operated circuit breaker extends this company's line of CSP distribution transformers through 250 kva, 240/480 v. The breaker protects against burnouts from secondary faults and gives warning of dangerous overloads by a signal light arrangement similar to the method used in previous designs.

This type ER circuit breaker, with new features designed around the principle of all-electric control, is a heavy-duty type capable of interrupting 23,000 amp at 240 v. The mechanism trips and recloses electrically so that either manual or automatic operation is obtained by simple control mechanisms, the manufacturer reports.

The new breaker will be used first for 167-kva rating on 120/240-v circuit. Ratings 75 through 250 kva, 240/480 v will be available in the early part of 1960.

U-Cable Guards

(9) *Line Material Industries, McGraw-Edison Co., Milwaukee 1, Wis.*

A new line of U-cable guards for protecting power or telephone cables at ground entrance accommodates cables ranging through 3½ in. in diameter. They are designed to prevent physical damage to cables especially in areas close to automotive traffic lanes. For further information write for manufacturer's literature.

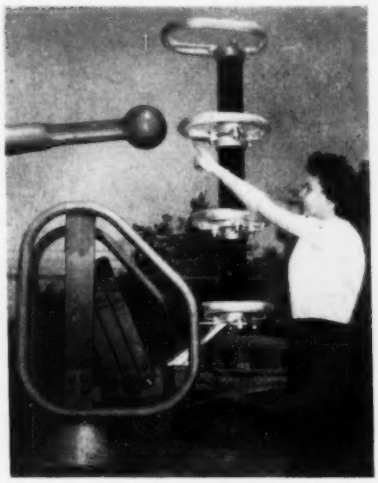
Limiting Device

(10) *Delta-Star Electric Division, H. K. Porter Co. Inc., 2437 Fulton St., Chicago 12, Ill.*

Installation of new transient limiting devices on 345-kv switches is claimed to solve a problem caused by unprecedented severity of interference from electrical discharge when switches are opened.

According to the manufacturer, the need for such devices became apparent when a utility with a large installation of 345-kv air brake switches found that interference was so severe that it affected nearby lightning arresters. The discharge occurred because of charging currents and other phenomena created by adjacent operating equipment.

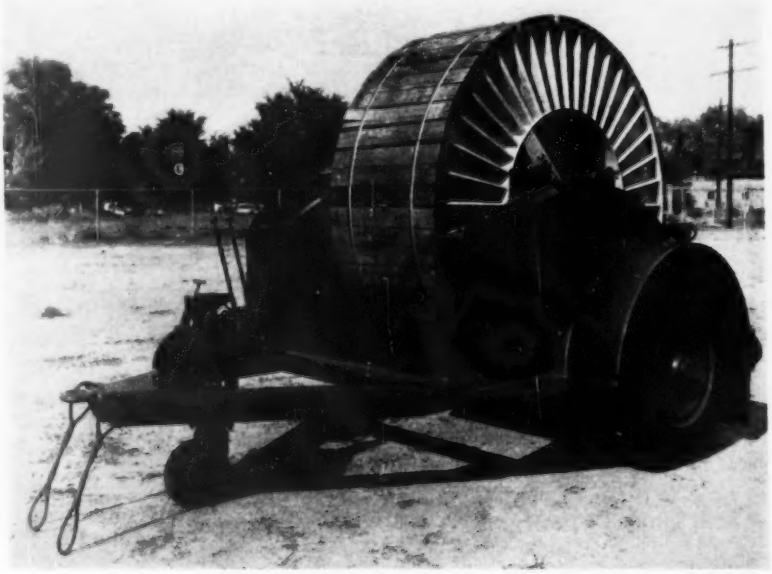
Bolted to the switch's front lug pad at the contact, the device is comprised of a porcelain tube approximately 4 ft high and 7 in. in diameter. With four aluminum control rings spaced 18 in. apart vertically, the unit weighs 75 lb. From bottom to top, the rings are increasingly more oval shaped, protruding toward the switch contact. As the switch opens, the blade rises vertically and the corona ball on its tip swings in an arced movement, passing no farther than 1 in. from each ring and sparking to the ring as it



passes. From the rings the current passes through resistors that dampen out the oscillating wave. This prevents the discharge from jumping from corona ball, back to contact.

The heart of this new device can be replaced simply and inexpensively whenever necessary, company engineers say.

Of a total of 20 openings of a three-phase switch, there were only five lightning arrester operational counts with the new device, it is reported. Without it, there had been 15 or more arrester operational counts for one opening of the switch.



(11) REEL CARRIER—Truck Equipment Co. of Denver has a new modified carrier that accommodates reels up to 62 in. wide. A newly designed axle, wheel and hub assembly permits this standard Truco trailer to take the larger reels. The modified trailer will handle reels of 96 in. diameter and up to 14,000 lb. Available on special order are trailers to handle reels up to 108 in. diameter, 72 in. wide with a 20,000 lb capacity. Payout tensioning and power pulling equipment for stringing cable and conductor under tension is offered as an accessory. For details, write the manufacturer, 3963 Walnut St., Denver

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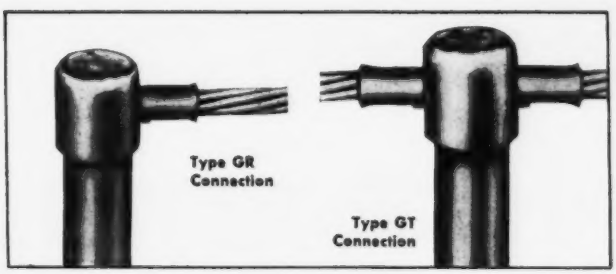
ONE-SHOT

PAT. PEND. BRAND

World's Simplest and Finest Cable to Ground Rod Connections



All parts packed in Mold

Dump Cadweld powder in mold

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ERICO PRODUCTS, INC., has just introduced a new adaptation of the CADWELD (the original copper thermit principal) PROCESS of electrical connections, the "ONE-SHOT" Mold.

The world's finest permanent electrical connection has now been adapted to a one-time ceramic mold for cable to ground rod connections. Now a simple 3" package contains all materials necessary to make the connection that never corrodes or loosens and has a current carrying capacity greater than the conductors.

The "ONE-SHOT" Ground Rod Connections are packed 12 to a box. Each is individually sealed in a polyethylene bag to prevent moisture absorption.

GROUND ROD	CABLE SIZE
1/2"	(#4 and smaller) (#2—#3)
5/8"	(#4 and smaller) (#2—#3) (1/0—#1)
3/4"	(#4 and smaller) (#2—#3) (1/0—#1)

For further information write ONE-SHOT % ERICO PRODUCTS, INC.

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The high, uniform, consistently-dependable quality of Crapo Galvanized Steel Strand is the direct result of close laboratory control over each step in manufacture. All wires used in forming a particular size and grade are produced from steel of selected analysis, carefully processed under technical supervision and stranded on precision machines. Both wire and finished strand are subjected to prescribed laboratory tests to insure the desired end result.

Heavy, uniform, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide maximum resistance to corrosion.

Write for booklet OG-25 containing "Sag and Tension Data for Overhead Ground Wire."

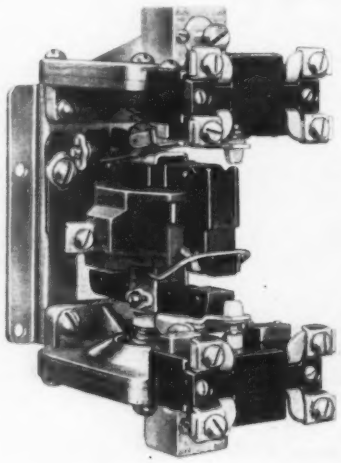
INDIANA

STEEL & WIRE CO., INC., Muncie, Indiana

Rear-Lamped Floodlights

(12) *Steber Mfg. Co., Division of Pyle-National Co., Broadview, Ill.*

A new line of rear-lamped floodlights for sports and industrial application has been designed to meet NEMA specification FL6-210, group B, types 1, 2, 3, 4 and 5. Reflectors are spun aluminum, finished in the manufacturer's Anodal process, to provide a reflecting surface that resists grime and dirt. Details are in bulletin No. 1097 from the manufacturer.



Two Timing Heads

(13) *Square D Co., 4335 Valley Blvd., Los Angeles 32, Calif.*

This manufacturer has announced a pneumatic time-delay relay for applications where two separate timers would normally be used for on-delay and off-delay operation.

Two timing heads operate from a common magnet assembly to provide time delay after energization and time delay after de-energization. Each timing head has a single-pole double-throw snap switch with an adjustable timing range of .2 second to 1 minute.

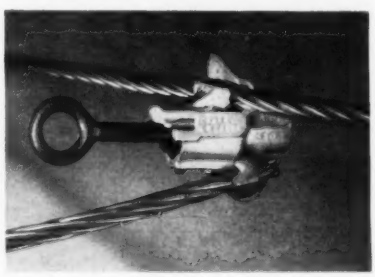
Mounting dimensions of the new timer are the same as the type DO relays and types A and H timers. Panel space is saved because the unit is the same width and only slightly longer than a single type A timer. The combination of two timing heads on a single unit means only one device to be wired and mounted, thus saving installation time, according to the manufacturer. Details may be obtained by writing for bulletin 9050-10.

Solid Blade Dropout Cutout

(14) *Hubbard & Co., 200 S. Michigan Ave., Chicago 4, Ill.*

This open dropout cutout is equipped with a solid blade to serve as a disconnect switch. Use of a solid blade in the 100-amp cutout base gives the device a 200-amp rating. A disconnect switch of this type has a momentary rating in excess of 2,500 amp, it is stated.

This combination provides an economical 200-amp disconnect switch in the distribution voltage class, according to the manufacturer, who states that a fuse holder can be substituted for the solid blade at a later date should an interrupting device be required at the particular circuit location.



Hot Line Clamps

(15) *Anderson Electric Corp., Birmingham, Ala.*

A series of nonrelating hot line clamps has been added to the manufacturer's Dura-TAP line and is available in both aluminum (AH) and bronze (BH). Special features of the clamps include an extended "beak" to guide the clamp onto the main with minimum arcing. The main groove is semi-elliptical in

shape to insure greater contact and wedging action. A special guide in the groove also helps position the main.

All threads are fully protected regardless of the position of the keeper. This minimizes the danger of having movable parts freeze and prevents "seizing" of threaded members, the manufacturer states. A high-compression spring compensates for keeper relaxation, insuring full contact at all times. In addition, the top rail of the keeper rides under the main body of the clamp and prevents relaxing cantilever action on the keeper. The keeper is further stabilized by a keeper guide lug.

Both the AH and BH are available in three sizes to cover popular conductor ranges. The AH series can also be ordered plated for general purpose application.

Switch

(16) *Southern States Equipment Corp., Hampton, Ga.*

A shuntless tilting insulator switch, type TRS, is available in voltage ratings of 7.5 kv to 23 kv and continuous current ratings of 400 and 600 amp. Switches rated 400 amp have a momentary rating of 20,000 amp, while those rated 600 amp have a momentary rating of 40,000 amp.

The manufacturer states that it has incorporated AMPLITACT® contacts for the first time in a tilting insulator switch. This reverse loop type of contact provides more than adequate capacity for handling the short circuit currents for which the switch is rated.

The TRS features an extra-large sleet hood, which prevents ice collecting on the contact assembly.

The TRS is generally applied for line sectionalizing, station disconnecting and line tap disconnecting. It is usually pole-top mounted.

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General Electric Announces NEW

"COMPACT ISOKRAFT* 50"

17% LESS WEIGHT than the former "ISOKRAFT 50" Capacitor

26% LIGHTER than the next lightest 50 Kvar Capacitor

20% LESS VOLUME than the next smallest 50 Kvar Capacitor

NOW WEIGHING ONLY 82 POUNDS, General Electric's new "COMPACT ISOKRAFT 50" capacitor is by far the lightest, smallest, and easiest to handle 50-kilovar unit ever available. Improvements in ISOKRAFT** paper dielectric, refinements in quality control and better manufacturing techniques make possible this compact unit and contribute to its lower price. "COMPACT ISOKRAFT 50" units cost less to install than other heavier, bulkier capacitors. The reduction in weight from the "ISOKRAFT 50" capacitor's 99 pounds permits even more kilovars per pole. For example, now G.E.'s new 900-kilovar switched equipment weighs the same as the original 600-kvar equipments. For future planning these lighter capacitor units and equipments will permit use of smaller poles.

Contact your General Electric Sales Representative for complete information on the new "COMPACT ISOKRAFT 50" capacitor, or write for Bulletin GEA-7061, Section 445-30, General Electric Company, Schenectady 5, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

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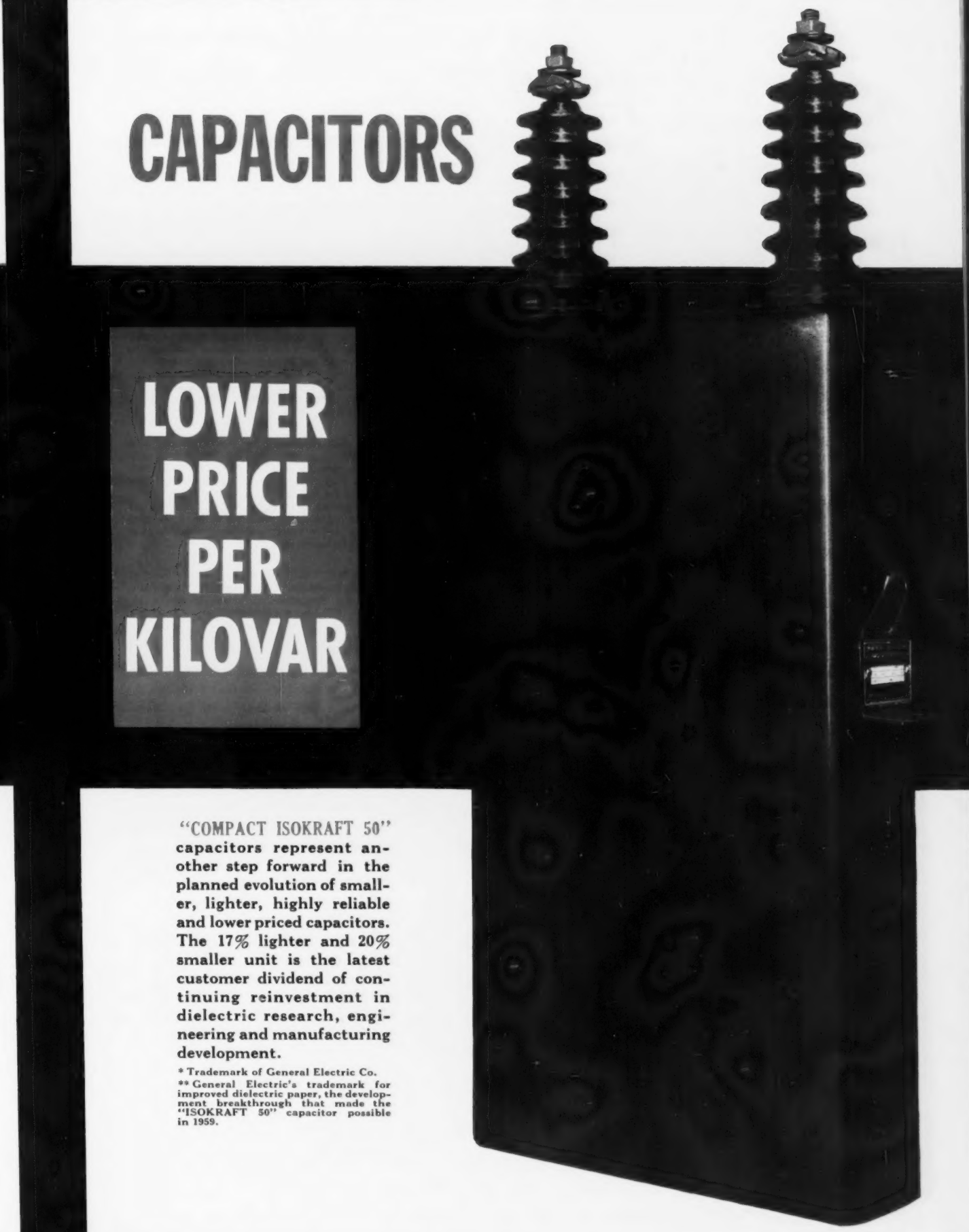
CAPACITORS



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"COMPACT ISOKRAFT 50" capacitors represent another step forward in the planned evolution of smaller, lighter, highly reliable and lower priced capacitors. The 17% lighter and 20% smaller unit is the latest customer dividend of continuing reinvestment in dielectric research, engineering and manufacturing development.

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** General Electric's trademark for improved dielectric paper, the development breakthrough that made the "ISOKRAFT 50" capacitor possible in 1959.

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—the most satisfactory pulling line available today!

* GREAT STRENGTH
(9,600 lbs. tensile for ¾" diam.)

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(11.7 lbs. per 100 ft., ¾" diam.)

* HANDLES AND SPLICES LIKE MANILA
in any climate or weather.

* WATERPROOF,
(even salt water) can't mildew; excellent dielectric properties.

PENGO-Prope is a synthetic rope of special construction for pulling line use; no other rope can match its safety and cost-saving performance! Write today for literature, prices.

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LINE STRINGING SWIVELS

Special models of the well-known MILLER swivels redesigned specifically for tension line stringing use.

The result is a reliable, heavy duty swivel of proper dimensions to pass through stringing sheaves and bullwheel grooves easily, without damage.

PETERSEN ENGINEERING CO., INC.
Santa Clara, California
B-10 Phone: AXminster 6-7712

BULLETINS ETC.

(17) **POWER PACKAGE**—The power package of the new Holan Uni-Power Body includes a 56-hp gasoline engine, hydraulic pump and oil reservoir, and hydraulic winch mounted as a unit. The unit powers the derrick, winch, digger and hydraulic jacks and can be removed for repair or replacement without removing the body or hydraulic piping. The hydraulic lines are mounted under the floor of the body and clear of the chassis, thus simplifying body mounting and change-over. Details from the manufacturer, Holan Corp., 4100 W. 150th St., Cleveland 35, Ohio.

(18) **BASEBOARD** — Engineering information on Plugmold 2200 is contained in an illustrated, 4-page folder from the Wiremold Co., Hartford, Conn. Use of this multioutlet baseboard system with Snapicoil, prewired receptacles ready to be snapped into the holecut cover is described. Other data include information on devices and fittings, methods of fastening to various surfaces and installation.

(19) **LIGHTING**—A new line of fixtures using two miniature 4-w fluorescent tubes to give high intensity, localized illumination is described in a bulletin from Products For Industry Inc., 1530 Summer St., Stamford, Conn. Called Product-A-Lite, these units have one basic reflector assembly and a variety of holding arms to suit many applications. Magnifier units are included in the nine models.

(20) **FREQUENCY METERS**—Bulletin 52-11 from James G. Biddle Co. gives details on Frahm resonant reed frequency meters. Precision frequency meters with guaranteed permanent accuracies of plus or minus 0.1% of calibrated frequency are offered for the first time, the manufacturer states. Copies of the new bulletin are available from Biddle at 1316 Arch St., Philadelphia 7, Pa.

(21) **INSULATION** — Why and where it pays to use silicone rubber insulated cable is the subject of a bulletin put out by G-E's Silicone Products Department, Waterford, N. Y. This bulletin CDS-208 lists insulated properties of class 900 electrical grade silicone rubber and discusses major application areas.

(22) **FIXTURES**—Day-Brite Lighting, 6260 N. Broadway, St. Louis 15, has a new catalog section 20 covering its Troffer and Mobilex recessed lighting equipment. New styles are included and a breakdown of component parts offers the flexibility of requiring fewer parts in smaller quantities for a wider variety of fixture models, the manufacturer states.

(23) **METER SOCKETS** — A new line of 100-amp meter sockets is being made available by General Switch Co., Brooklyn 11, N. Y. UL approved, they come with either code gage steel or aluminum enclosures. Details in Product Data Bulletin No. 140.

KILL TWO BIRDS WITH ONE STONE—Fill out this coupon and get back valuable information from as many sources as you indicate.

ELECTRICAL WEST
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Please send me, without obligation, the new product information or catalogs:

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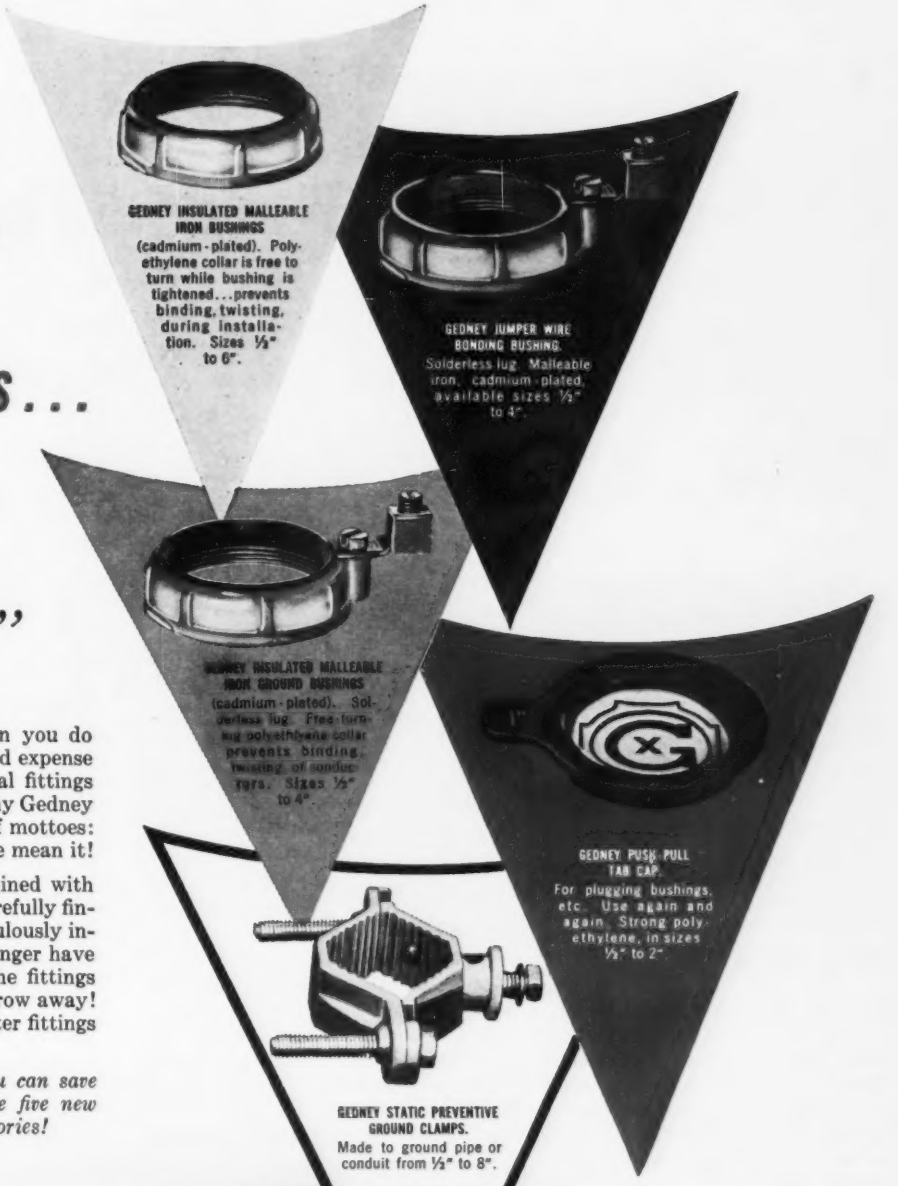
FIVE NEW GEDNEY PRODUCTS . . .

"that fit always!"

Nobody knows better than you do how much time, trouble and expense are involved when electrical fittings don't fit properly. That's why Gedney has adopted the simplest of mottoes: *Gedney Fittings fit.* And we mean it!

Gedney Fittings are machined with unfailing accuracy, then carefully finished, finally they're scrupulously inspected. *Result?* You no longer have to make allowances for the fittings (and time) you used to throw away! One more thing. These better fittings cost you no more!

Think of all the places you can save time and money with these five new Gedney Fittings and Accessories!



GEDNEY INSULATED MALLEABLE IRON BUSHINGS (cadmium-plated). Polyethylene collar is free to turn while bushing is tightened . . . prevents binding, twisting, during installation. Sizes ½" to 6".

GEDNEY JUMPER WIRE BONDING BUSHING. Solderless lug. Malleable iron, cadmium-plated, available sizes ½" to 4".

GEDNEY INSULATED MALLEABLE IRON GROUND BUSHINGS (cadmium-plated). Solderless lug. Free-turning polyethylene collar prevents binding, twisting of conductors. Sizes ½" to 4".

GEDNEY PUSH-PULL TAB CAP. For plugging bushings, etc. Use again and again. Strong polyethylene, in sizes ½" to 2".

GEDNEY STATIC PREVENTIVE GROUND CLAMPS. Made to ground pipe or conduit from ½" to 8".

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GEDNEY

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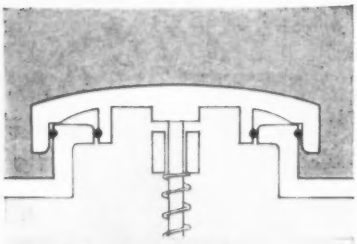
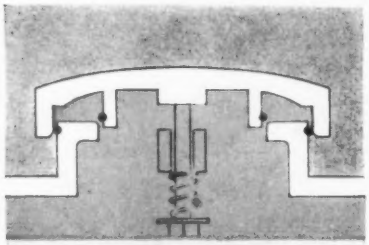
Another Pennsylvania FIRST Ends Transformer Pressure Worries

Automatic Pressure-Relief Device Available as Standard Equipment

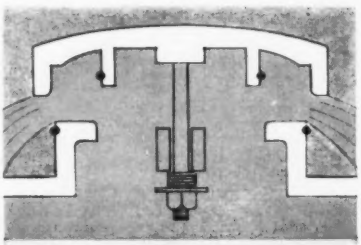
By JOHN KOEPKE
Mechanical Engineer



HERE'S HOW IT WORKS:
1. Pressure-relief device remains closed with normal pressure in the transformer.



2. Overpressure breaks the inside seal . . . extending the pressure area to the outside seal, and accelerating opening.



3. Device is fully open and exhausting gas.

WHY A PRESSURE-RELIEF DEVICE?

Uncontrolled pressures are a potential source of trouble in everything from cooking pots to jet airplanes. Down through the years many kinds of diaphragms and non-resetting relief devices have been used to get rid of potentially dangerous pressures in transformers. None was entirely satisfactory. Diaphragms required replacement. Other relief mechanisms had to be reset. With some designs no one knew for certain at what exact pressure the device would operate. In addition, *all* of the non-resealing mechanisms left the transformer open to possible contamination.

With these problems in mind, Pennsylvania Transformer engineers set out to develop a design so basically simple and yet so dependable that it could be counted on to open *and* close *automatically* whenever needed—whether at frequent intervals or after many years.

TESTS TOLD THE STORY

Since relief of sudden high pressures requires fast opening to a large exhaust area, the Pennsylvania design was proof-tested in a high-pressure tank using gas explosions with controlled rates of rise varying from 50 to *3080* psi per second. Even with a relatively low rate of rise, less than 300 psi per second, it took only eight thousandths of a second for the relief valve to fully open after the preset pressure was reached. Other tests revealed that it is the total size of the exhaust area that primarily controls maximum internal pressure. *This area in the Pennsylvania relief*

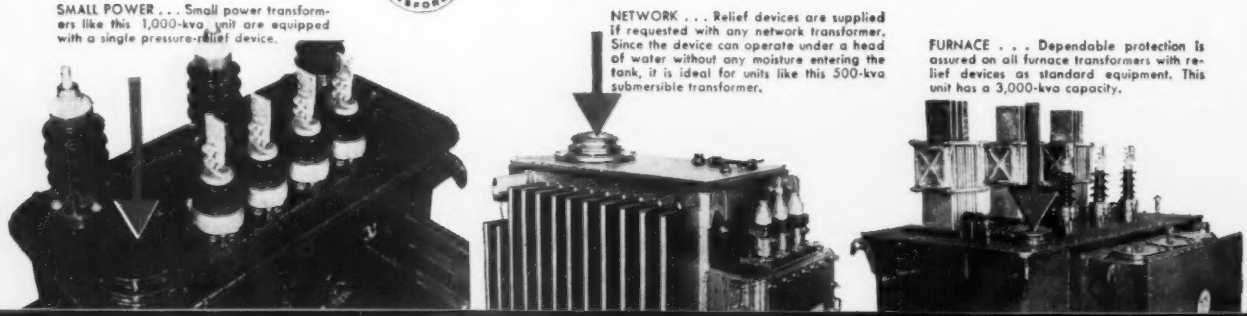
PENNSYLVANIA TRANSFORMERS

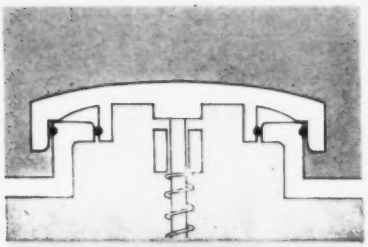
PENNSYLVANIA

SMALL POWER . . . Small power transformers like this 1,000-kva unit are equipped with a single pressure-relief device.

NETWORK . . . Relief devices are supplied if requested with any network transformer. Since the device can operate under a head of water without any moisture entering the tank, it is ideal for units like this 500-kva submersible transformer.

FURNACE . . . Dependable protection is assured on all furnace transformers with relief devices as standard equipment. This unit has a 3,000-kva capacity.





4. Valve is reclosed against positive pressure.

device is substantially larger than that of competitive designs.

BOOSTER ACTION HELPS DO THE JOB

When operation occurs, pressure first breaks the main inner seal by moving the valve head only five percent of its total stroke. The area to the outer seal is then exposed to pressure, doubling the opening force and resulting in an extra accelerating kick.

Closure of the relief device occurs automatically before any air is sucked into the transformer where it could produce a secondary explosion. A powerful spring overcomes the force of the gas being exhausted from the tank and reseals the cover while a low gas pressure remains inside the tank.

SURE TRIGGERING ESSENTIAL FOR DEPENDABLE OPERATION

Every Pennsylvania pressure-relief valve will operate within one-half psi of its calibrated setting. Pressure variations due to load changes in the transformer cannot prematurely trigger the device. Operation is controlled solely by a compressed spring held by a nut which is riveted to the shaft at the proper setting. This setting cannot be readily tampered with, and should the relief device be dismantled in the field, the design assures that it will be returned to the correct setting.

FOR SIMPLICITY: JUST TWO MOVING PARTS

Consistent operation *without attention* is assured by an inner pressure seal—an "O"-ring silicone gasket—under radial pressure against a permanently lubricated surface. Manufacturing tolerances are easily controlled to assure proper gasket pressure each time for perfect sealing. Designed with only two moving parts, the device is of simple, rugged construction with every part—aluminum housing, stainless steel shaft, and silicone "O"-ring gaskets—selected for minimum maintenance.

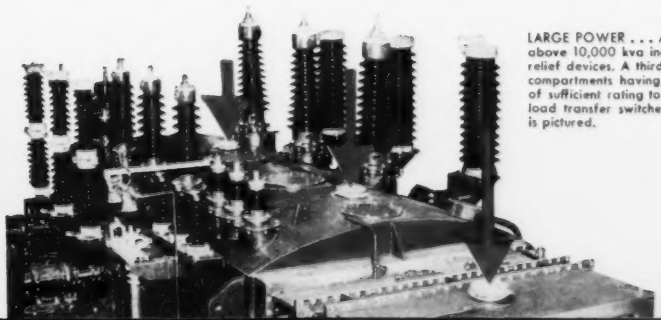
Optional extras include alarm contacts and a visual operation indicator easily reset from the ground.

* * *

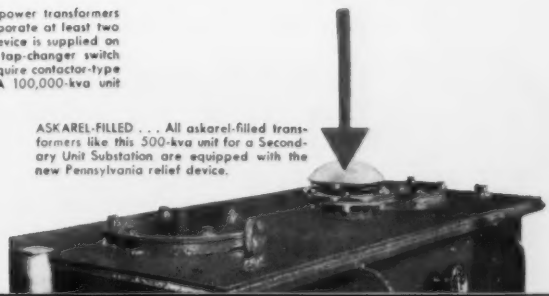
Our newly introduced Pennsylvania Transformer relief device is now available as *standard equipment* on Pennsylvania Transformers. Additional information is available on request from Power Sales Department, Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pennsylvania.

McGRAW-EDISON

POWER TRANSFORMERS



LARGE POWER . . . All power transformers above 10,000 kva incorporate at least two relief devices. A third device is supplied on compartments having a tap-changer switch of sufficient rating to require contactor-type load transfer switches. A 100,000-kva unit is pictured.



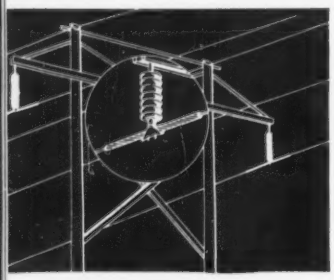
ASKAREL-FILLED . . . All askarel-filled transformers like this 500-kva unit for a Secondary Unit Substation are equipped with the new Pennsylvania relief device.

*Superformed** means better

ACCURACY • UNIFORMITY • GRIPPING

...*for* overhead line CONSTRUCTION, PROTECTION, REPAIRS

SUPERFORMING is an exclusive patented process for helical wire forming . . . *developed* by Fanner, the earliest commercial manufacturer of machine-formed armor rods . . . *formed* by special Fanner-designed machines with unequalled accuracy, freedom from surface damage or cross-sectional distortion . . . *tested* with specially-devised equipment simulating most severe operating conditions . . . *backed* by an organization which has built on Integrity, Service and Quality . . . *SAVES MONEY* because application is fast, simple, requires no tools . . . reduces maintenance . . . extends service life of conductors. That's why *more and more utilities are using more and more Superformed Products.* A-1429A

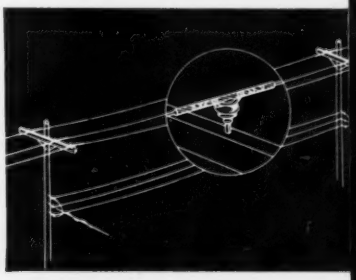


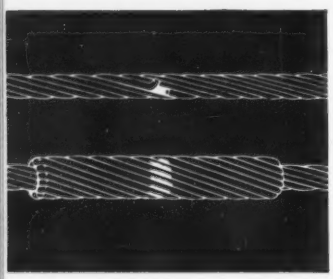
◀ ARMOR RODS

Protect against wind-induced and resonant-frequency conductor vibration at supporting points.

LINEGUARDS ▶

Protect at support points (and taps) in urban distribution where short spans are common; smaller wire sizes and shorter length than Armor Rods.



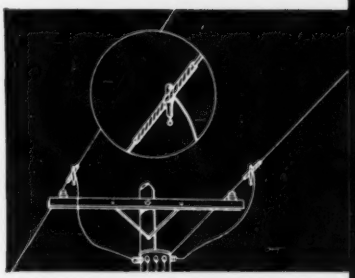


◀ PATCHRODS

Repair damaged or broken (up to 25% of strands) conductors, too far from support for Armor Rod to protect.

TAP ARMOR ▶

Protects where taps are required beyond extremities of Armor Rods on long spans or un-armored conductors.

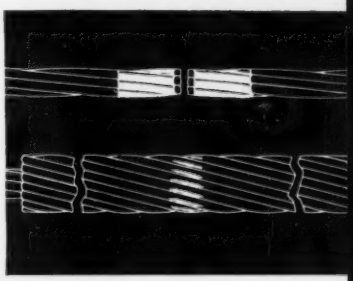


◀ FANNGRIPS

Provide ideal dead-ending and splices for wires, strands or cables for: Guys, Conductors, Multiplex Cables, Come Alongs, similar uses.

FANNSPLICES ▶

Join two ends of wire, or restore damaged conductors to original strength.



PLASTIC PRODUCTS FOR CONDUCTOR PROTECTION

Kover-Gard Ground Wire Moldings . . . Plastic Fannguards . . . Rigid and flexible Insulating Tubings. For field or factory application, wherever there is a real need for surface covering.

STOCKS . . . SERVICE

Fanner Superforms are sold and serviced nationally by 22 Manufacturers' Agents in 34 locations. Stocked by electrical distributors from coast to coast.

PACKAGING

Superformed Products go to you in pre-packaged sets . . . the correct number of rods, centermarked with identification. Also supplied in bulk.

*Trademark

Fine Fanner Superformed Products

THE FANNER MANUFACTURING CO.
Brookside Park • Cleveland 9, Ohio
Electrical Products Division

Licensed for use under or made in accordance with one or more of the following patents: Patent No. 2,587,521, 2,769,478, 2,588,663—Other patents pending.

APPLICATION DATA

Specification and ordering are made easy by Fanner Superformed Products Catalog EP-8. Contains 48 pages of Selection, Application, Installation information.

"ADVANCE® FLUORESCENT LAMP BALLASTS SAVE OUR COMPANY MONEY AND KEEP OUR CUSTOMERS HAPPY"

"Fluorescent Lighting Units utilizing efficient, cool operating ballasts require a minimum of service calls that are so costly to us and such an inconvenience to our customers. Quality ADVANCE FLUORESCENT LAMP BALLASTS save our company money and keep our customers happy".

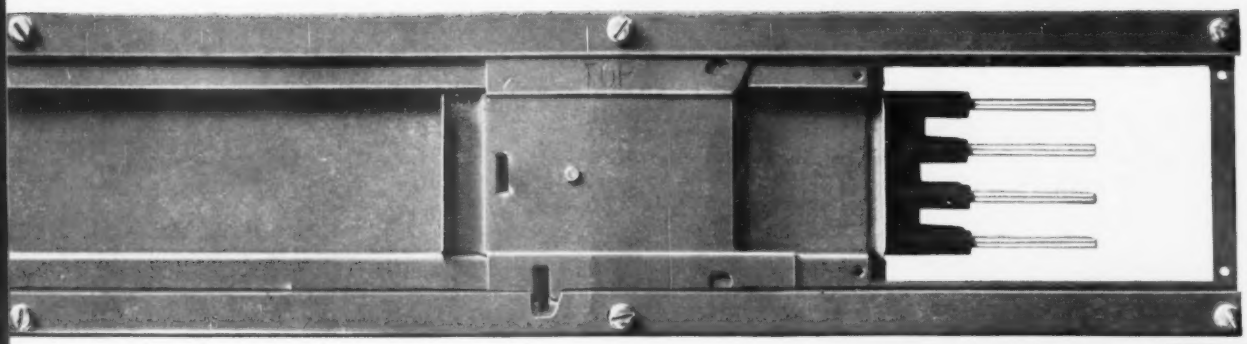
To avoid expensive call-backs and costly down-time for your customers, always demand ADVANCE dependable Fluorescent Lamp ballasts. Their efficiency and performance is proved in millions of lighting units. They are the choice of the nation's leading Original Lighting Equipment Manufacturers and America's foremost Electrical Contractors. Reputations are built and maintained on ADVANCE Fluorescent Lamp Ballasts . . . truly, "The Heart of the Lighting Industry".

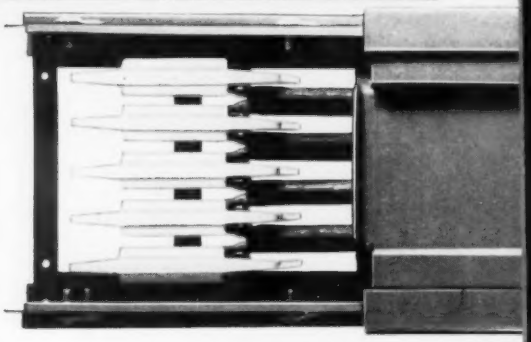
"The Heart of the Lighting Industry."

ADVANCE® TRANSFORMER CO.
2950 NO. WESTERN AVE. CHICAGO 18, ILL. U.S.A.

Manufactured in Canada by: Advance Transformer Co., Ltd. 5780 Pare Street, Montreal, Quebec, Canada

INTRODUCING NEW



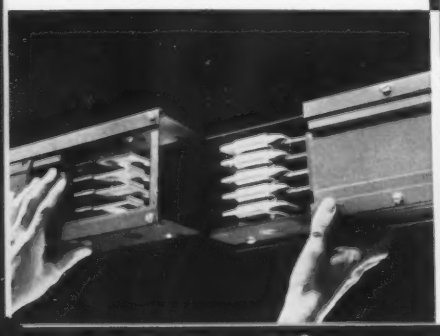


The safest, fastest-to-install plug-in duct ever designed!

Now BullDog, the originators of Bus Duct systems, gives you new safety for plant personnel plus new installation speed and economy with new XL BUStribution duct! Completely Butyl covered aluminum bus bars give true dead-front construction. Crews can now install more duct in a day than ever before. Superior engineering provides low voltage drop . . . down to half that of other plug-in duct systems . . . plus unexcelled short circuit rating. BullDog gives you completely engineered fittings. You can get everything you need from a single source —your local BullDog distributor. Call him—he'll give you a demonstration of all the XL safety and installation features.

FAST INSTALLATION

Keyed bus ends align themselves positively, instantly, without fumbling or wasted time. You can position sections as fast as you can handle them!

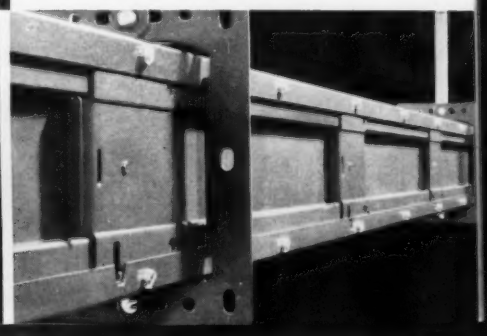


EASY INSTALLATION

This one integral bolt locks POSITIVELY . . . holds keyed bus ends under a ton of pressure. The fully insulated bolt spins tight *fast*. Joints stay locked!

ECONOMICAL INSTALLATION

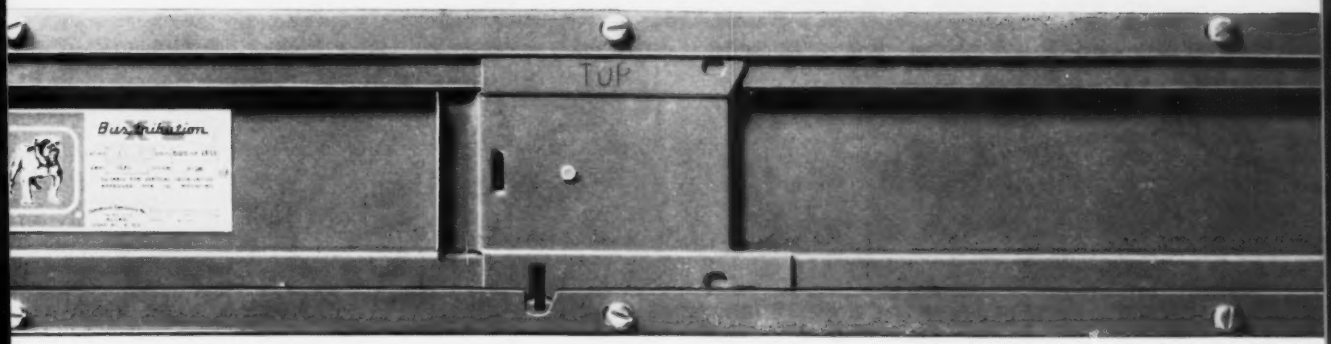
You need only half as many hangers as usual. Ten-foot supporting spans cut number of hangers *and the time needed to install them* by 50%.

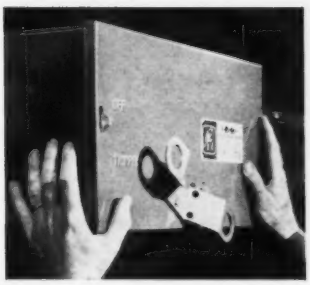


BULLDOG

XL

BUStribution® DUCT





The new **XL SAFETY-PLUG** is faster, safer to use than any other plug!

XL Safety-Plug has new, simplified design. You can plug-in on XL duct in seconds. It has safety features not found on any other plug. Plugs are available which prevent installation or removal when plug handle is in the "on" position. You can plug in from either side of the duct, in all duct sizes from 225 through 1000 amps. You can use all plug-in openings at the same time, if desired.

When you see your BullDog distributor about XL duct, examine the Safety-Plug he has on display, too. Here's an electrical team you can depend on to do the job better in every way!

BULLDOG ELECTRIC PRODUCTS DIVISION
I-T-E CIRCUIT BREAKER COMPANY
BOX 177 • DETROIT 32, MICHIGAN

In Canada: 80 Clayson Rd., Toronto 15, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

Consult the following Pacific Coast representatives:

Coast Electric & Manufacturing Co.
1733 N. E. Seventh Ave., P. O. Box 7712
Portland 12, Oregon

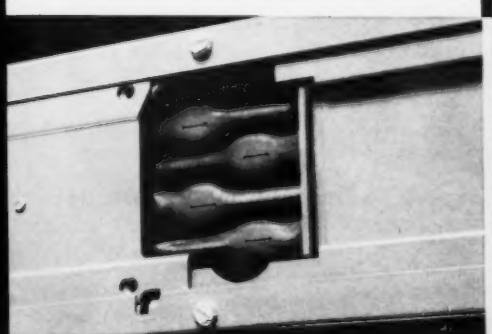
Safety Switchboard Company
910-89th Avenue
Oakland 21, California

Young Electric & Mfg. Co.
2134 Curtis St.
Denver 2, Colorado

BullDog Elec. Prod. Co. of Los Angeles
2885 E. Washington Blvd.
Los Angeles 23, California

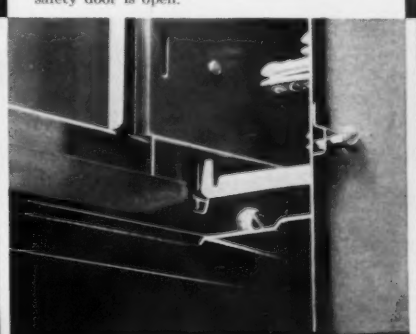
DEAD-FRONT SAFETY

Each bus bar has full-length Butyl insulation, even in bus plug openings. XL BUStribution Duct is the world's safest duct to plug into, to work around.



PERSONNEL SAFETY

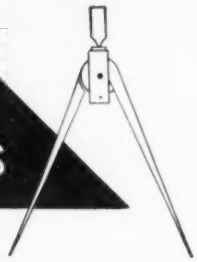
Safety door covers the opening . . . slides back when safety interlock finger is in position. Plug cannot be removed or installed when safety door is open.



EQUIPMENT SAFETY

SAFETY PLUGS cannot be installed or removed when in the "on" position . . . exclusive design positively protects against arcing, safeguards equipment.

ENGINEERED INTO BLACKBURN'S COMPRESSION CONNECTORS



High Conductivity-

Blackburn has engineered all compression connectors shown to fit your present tooling program—and added advantages to meet engineers' and linemen's requirements.

Type SH

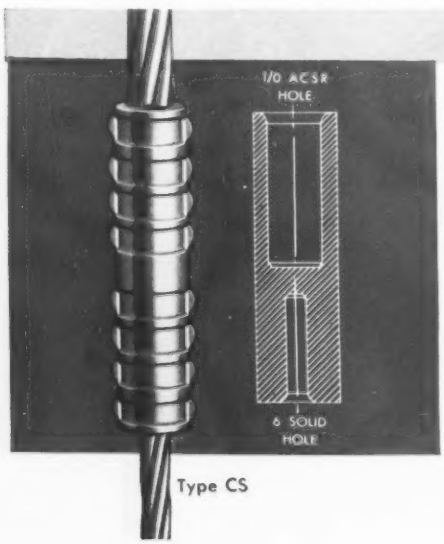
Type HT Prefilled

Type SH Prefilled

Type HT

Standardization now possible with Blackburn "H" frame connectors

- **Designed to fit the tools you already have for applying "H" frame type connectors.**
- **Full length tab completely seals out moisture, easiest to bend and install!**
- **Shot blasted to improve conductivity and retard corrosion.**
- **Prefilled with Blackburn's superior oxide-inhibiting compound, Contax, in easy-tear tab vacuum package.**
- **Color fast, large, easy-to-read lettering.**
- **Type HT is reversible, both grooves "open". For large aluminum tap to smaller copper main. Also used for dead ending.**



Type CS

You get higher conductivity with Blackburn service entrance sleeves

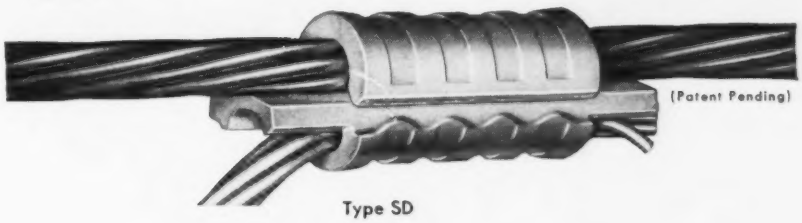
Blackburn—and Blackburn *alone*—provides greater contact area where needed, to assure greater conductivity. This is accomplished by increasing hole depth as the diameter of the conductor is increased, thereby providing more contact area for the conductors being connected.

The Color Coding is *printed* for quick, positive identification.

The sleeves' ends are sealed with Aluminum Sensitized Tape, which is easy to puncture . . . and, if a particle of the seal is pushed into the chamber, the particle is conductive.

Contax, Blackburn's superior oxide-inhibiting compound, is already in these sleeves *in measured amount*. Won't squirt out on glove or in face. And the solid center stop in a Blackburn Sleeve assures proper distribution of the inhibitor around the conductors. Designed for tooling you have.

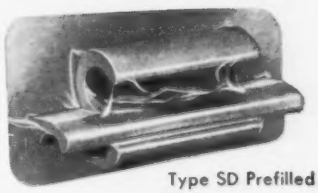
High "Use-Ability"



Type SD

Exclusive drip-guard separator in Blackburn 6-frame tap connector gives *extra* protection to bi-metallic connections

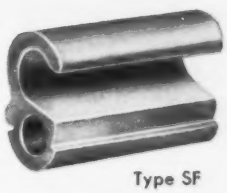
- Spacer allows SD Connector to be used for bi-metal connections with the tools you already have for "C" Frame type connectors.
- An economical substitute for "L" taps, since extended drip guard gives extra insurance against corrosion products bridging the bi-metallic gap.
- A true *two-handed* connector, very adaptable for hot line work.
- Shot blasted for highest conductivity and corrosion resistance.
- Prefilled with Blackburn's Contax and vacuum packed for insurance against corrosion.



Type SD Prefilled

Type SF

- Recommended for aluminum to aluminum.
- Spacer gives better protection against strand breakage.
- Can be installed with same tooling used for Type SD.
- Prefilled with Blackburn's Contax and vacuum packed for insurance against corrosion.



Type SF

Type TR

Blackburn neutral repair sleeves save dollars on triplex services

- Salvage short lengths of pre-assembled service drop cable with Blackburn Sleeves.
- Designed for and tested with the tools you already have.
- Extra length engineered for neutral pullout values in keeping with dead end devices.

See JB Catalog 858 for Tooling INFORMATION

LIVE BETTER ELECTRICALLY

JASPER BLACKBURN CORPORATION

1525 Woodson Rd., St. Louis 14, Mo. • WYdown 3-9430

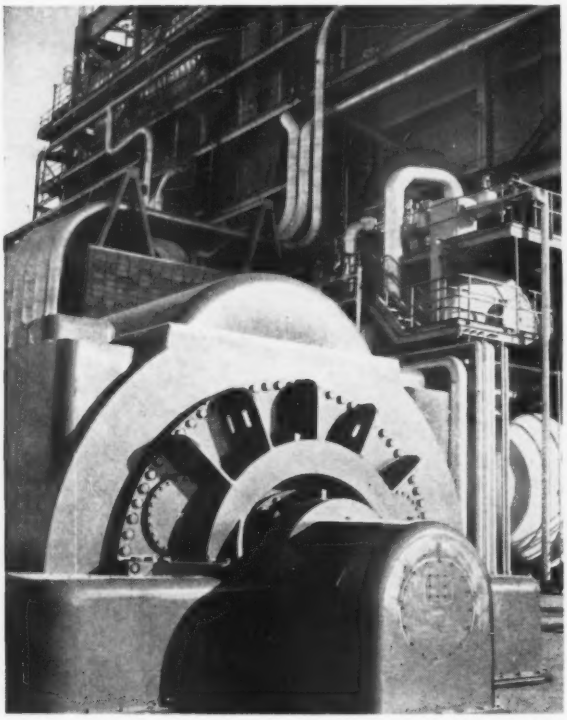
For phone number of closest representative see advertising index in back of book.

STANDARD ENGINEER'S FIELD REPORT

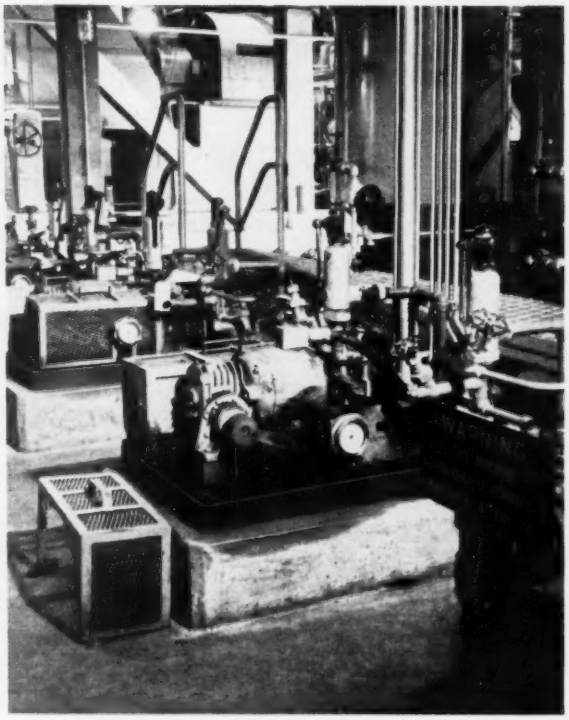
PRODUCT Chevron Industrial Grease

FIRM Alamitos Steam Station Southern California Edison Co.

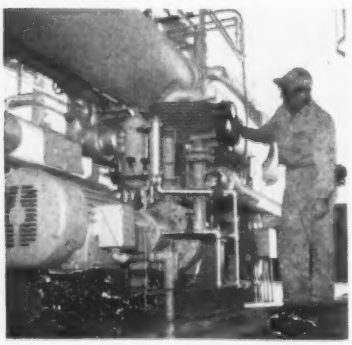
Chevron Grease replaces four at Alamitos Station

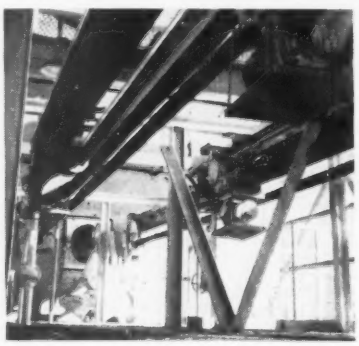


Instead of 4 different greases frequently used in large steam generating plants, Southern California Edison Company's up-to-the-minute, 350,000 KW Alamitos Steam Station (above) meets all its needs with versatile Chevron Industrial Grease.



Rust protection of Chevron Industrial Grease and its unusual water resistance make it ideal for lubricating bearings of chemical feed pumps and their motors (above). Pumps feed Hydrazine to condition boiler water before it enters tubes.





Maintenance is simpler and there's no chance of error using same lubricant for sump pumps (left), boiler cleaning lances (right) and all other greased equipment. Firm selected Chevron Industrial Grease for Alamitos as a result of several years satisfactory performance at their Terminal Island Station.

Why Chevron Industrial Grease provides Superior Lubrication

- Top wear-prevention qualities
- Unusual water resistance
- Rust protection
- Non-corrosive
- Mixes with any grease
- High work stability
- Melting point, 500°F. plus
- Pumpable over wide temperature range

For More Information on this product contact your Standard Engineer or Representative or write 225 Bush St., San Francisco 20, Calif.

CHEVRON Industrial Lubricants

TRADEMARK "CHEVRON" AND CHEVRON DESIGN REG. U.S. PAT. OFF.

STANDARD OIL COMPANY OF CALIFORNIA

9 miles of SPANG Conduit protect wiring in the new Plaza Apartments, Wilmington, Del. Benjamin J. Lener, general foreman, Light & Power Construction Co., reports Spang uniformity provided a good job, saved installation time, protects his company's reputation. Uniformity of Spang Conduit meant consistently good bends and fast, accurate threading on the job. Smooth interior finish provided easy wire pulling, prevented wire damage. The HD Galvanized finish has high corrosion resistance, didn't flake or chip during bending. You'll get top-quality jobs with Spang, too. See your local Spang Distributor for fast service!

Architect: Victorine & Samuel Homsey, Wilmington
General Contractor: Ernest di Sabatine & Sons, Inc., Wilmington
Electrical Engineer: Everett Miller, Philadelphia
Electrical Contractor: Light & Power Construction Co., Elsmere, Del.
Spang Distributor: Westinghouse Electric Supply Company, Wilmington

SPANG CONDUIT

THE NATIONAL SUPPLY COMPANY
Two Gateway Center, Pittsburgh 22, Pennsylvania
Subsidiary of Armco Steel Corporation

For UNDERGROUND
Wagner SUBURBAN
PAD MOUNTED TRANSFORMERS
Available in single-phase, 25-167 Kva;
three-phase, 75-500 Kva.

DISTRIBUTION...

WAGNER SUB URBAN TRANSFORMERS

are safe... well-ventilated ...adaptable to future load growth

Plotting a new subdivision? Planning a new shopping center? Reworking, modernizing a distribution system? Write Wagner Sub-Urban Pad Mounted Transformers into your standards.

Wagner Sub-Urban Pad Mounted Transformers are designed to be used wherever underground distribution is necessary or desirable. They are ideal for use in residential areas. Compact in size, low in profile, they can be hidden behind plantings of shrubbery.

Safe to use? Certainly. A padlocked, tamperproof enclosure protects your equipment... protects people. The public is protected from exposed hot-lines... and, your crews are protected, too, by a door over the primary compartment which lets them work on the secondary without danger from high voltage.

Sub-Urban Transformers are well-ventilated... they can be loaded to capacity. When load growth makes it necessary, larger transformers can be quickly and easily installed to replace the original transformer units. These transformers normally require only routine maintenance. Due to better protection, far fewer faults occur in an underground system over a period of time than would generally occur in a comparable overhead system.

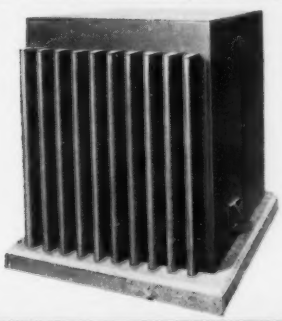
Get the whole story of Wagner Sub-Urban Transformers. Consult your nearby Wagner Sales Engineer, or write for Bulletin TU-148.

Wagner Electric Corporation

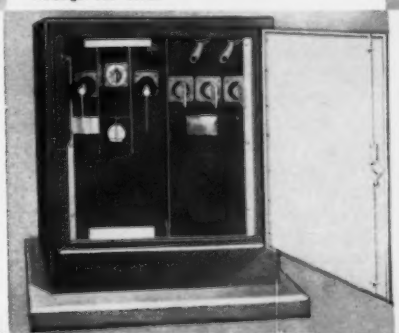
6381 PLYMOUTH AVE., ST. LOUIS 33, MISSOURI

WT60-4

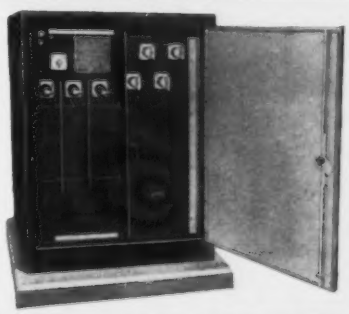
BUILT TO LAST—Tank is of heavy gauge sheet steel, with welded-on cover. Smoothly shaped radiators are welded to tank along their entire length. Complete special asphalt-type undercoating gives lasting protection against rust and corrosion.



SINGLE-PHASE—Terminal cabinet of a 100 Kva single-phase transformer. Barrier plates are provided between high voltage bushings and between high and low voltage compartments. Single-phase ratings from 25 through 167 Kva.



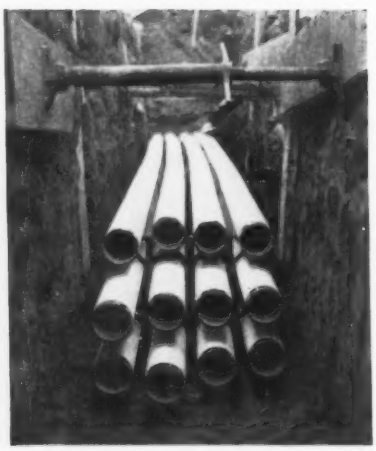
THREE-PHASE—Terminal cabinet of a 225 Kva three-phase Sub-Urban Transformer. High voltage tap changer is at the left side of the nameplate. Three-phase pad units are available in ratings from 75 through 500 Kva.



Get peak cable protection ***at lowest dollar cost***

Transite Ducts can be laid directly in trench without concrete envelope. Or if ductbank is to be concrete enclosed—thinner walled Transite Duct may be used. In all other respects both heavy-wall and thin-wall Transite Ducts are identical.

Transite Ducts save on the job and after!



No other duct material gives you so many installation and in-service economies

In every way, Transite® Ducts are the most efficient electrical ducts you can install. And—when assembled with J-M's Plastic Coupling—their cost is remarkably low!

One reason for this economy is in installation. Strong, lightweight, long—Transite lengths are easy to handle and install . . . Your men set the ducts in place easily, join them tightly in seconds. Transite's smooth bore is free of burrs and obstructions. Thus, long cable pulls are easily accomplished with no damage to cable sheathing.

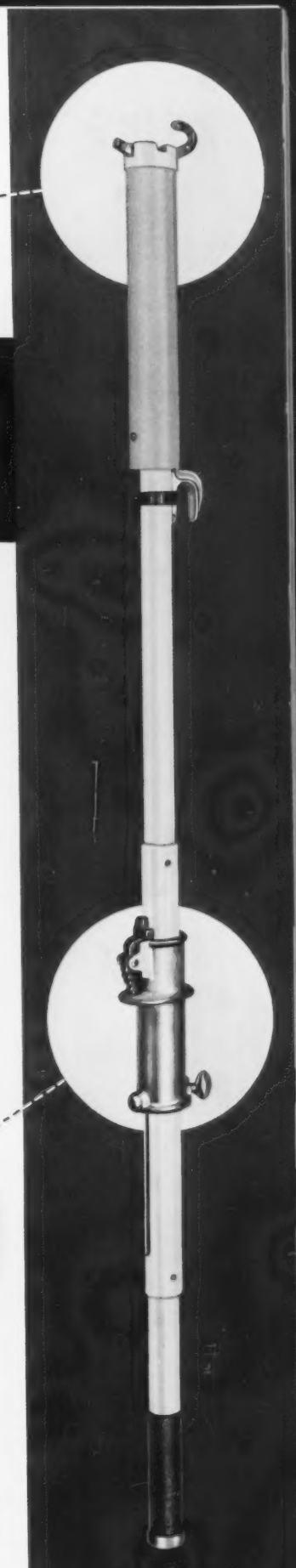
You see another reason for Transite's economy in performance. Once in service, Transite's unusually high rate of heat dissipation means cables run cooler, last longer. Transite also confines arc damage . . . cannot burn, smoke or fume. It won't generate explosive or toxic gases. If arcing does occur, Transite Ducts won't sag or adhere to cable.

Let us send the Transite Duct brochure EL-29A. Write Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

JOHNS-MANVILLE JOHNS-MANVILLE JM PRODUCTS

For phone number of closest representative see advertising index in back of book.

¾ HOOK . . . preferred by linemen, makes it easier to engage the eye of the clamp to be removed. Extra-strong bronze ¾ hook seats deep in head casting to prevent twisting open. Note, too, how yellow color assures hi-visibility where it counts most . . . at the "business end" of the stick.



new!

KEARNEY

YELLOW FIBERGLAS CLAMPSTICK

...with enclosed mechanism...added safety features

NEW! **A shotgun stick you can always see . . . in any light . . . against any sky . . . in the beam of a spotlight.**

NEW! **Telltale yellow surface shows instantly if the stick is safety-clean.**

NEW! **Smooth-as-silk operation . . . fully enclosed operating rod and mechanism . . . ¾ hook . . . thumb latch.**

Kearney's new clampstick combines the lightness, ruggedness and high dielectric strength of a Fiberglas pole with a slick new mechanism . . . plus an important bonus . . . yellow color permanently molded-in for maximum visibility. Needs no costly refinishing.

Operating rod mechanism is fully enclosed, protected . . . prevents rod damage, eliminates rod servicing. Only 3 moving parts . . . nothing to bind, stick, get out of adjustment. Field-strips for fast, easy cleaning by removing only *one* screw. Equipped with ¾ hook . . . thumb latch, safety-lock and stop. Non-slip grip.

Yellow non-porous surface instantly shows soil, grease or dirt which might cause excessive leakage . . . wipes "safety-clean" in seconds.

Tested for 100 kv per foot for 5 minutes.
Available in 4′, 6′, 8′, 10′ and 12′ lengths, one-piece or hinged.

801

THUMB LATCH . . . conveniently located on aluminum operating handle. Faster, easier to use with gloves. In latched position keeps hooks open while engaging clamp eye . . . prevents accidental retraction of hook. Sharp downward pull of handle releases latch, closes hook. Safety stop prevents accidental opening of hook while clamp is engaged. A locking wing screw is also provided.

for better construction . . . safer maintenance . . . specify KEARNEY products

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

JAMES R. KEARNEY CORPORATION

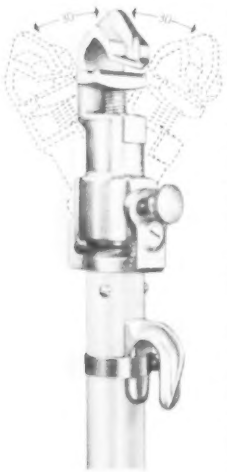
4224-42 Clayton Avenue, St. Louis 10, Missouri

PLANTS AT: ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH & CLARINDA, IOWA • GUELPH, ONTARIO, CANADA

IN THE WEST: for prompt service, contact Kearney's West Coast Distributor, **Maydwell and Hartzell, Inc.,**
Los Angeles • Seattle • Portland • San Francisco • Spokane • Phoenix

3 Kearney products to make the lineman's job easier...safer!

ADJUSTABLE HEAD JUMPER HOLDING TOOL



Aluminum alloy head is adjustable 30-degrees either side of center . . . rigid in all positions.

Gives positive control . . . tight grip . . . easiest handling of slack conductors. Enables linemen to maintain required safety clearance when working jumpers on difficult angles. Invaluable for accurately positioning jumpers at maximum reach from pole . . . for making hot line splices and taps.

Clamping screw has smooth, no-drag drive. Yellow Fiberglas handle and plastic covered, laminated fir, clamp-screw operating rod provide maximum safety. Light weight, wide range . . . 6 solid to 336.4 MCM ACSR. Pole length 4′ or 6′.

JUMPER CLAMP

Extra-wide range accommodates the large conductors of high capacity distribution systems . . . 1,192.5 MCM ACSR or 1,300 MCM stranded to 6 solid. Jumper cables up to 4/0 15,000 volts fit in the T-bolt terminal . . . without disassembly for installation. The aluminum alloy head will carry 400 amps. Maximum safety is assured by a yellow Fiberglas handle over the plastic covered, laminated fir, clamp-screw operating rod with colored-coded, non-slip gripping area. Light weight . . . only 4 pounds.

COMPRESSION FERRULE ALUMINUM GROUNDING SETS

The only "dead" or de-energized circuit is a *grounded circuit*. Get safe cable connections . . . less weight . . . with this family of grounding clamps for *aluminum* grounding cable. Ferrules are compressed onto the cable with the WH-1 or WH-2 hydraulic tool . . . threaded into the frame . . . locked with a jam nut. Take 600 volt aluminum grounding cable up to 4/0. Single grounding clamps and 2-, 3-, or 4-clamp cluster sets available in two sizes with ranges from 8 solid to 666.6 MCM ACSR or to 2″-diameter. Jaws of flat face clamp open 1.5″.

for better construction . . . safer maintenance . . . specify KEARNEY products

JAMES R. KEARNEY CORPORATION

JAMES R. KEARNEY CORPORATION

4224-42 Clayton Avenue, St. Louis 10, Missouri

PLANTS AT: ST. LOUIS • FAYETTEVILLE, ARKANSAS • SHENANDOAH & CLARINDA, IOWA • GUELPH, ONTARIO, CANADA

IN THE WEST: for prompt service, contact Kearney's West Coast Distributor, **Maydwell and Hartzell, Inc.,**
Los Angeles • Seattle • Portland • San Francisco • Spokane • Phoenix

501

more oomph

Like some people, some derricks have a little extra oomph. This derrick—Holan's Series 6800 has it . . . especially in the lower operating ranges.

The 6800 has extra strength because of extra lift cylinders—four instead of two. It lifts 2,000 pounds when only 5½ feet from the ground . . . body-loads 4,000 pounds. Capacity is 8,000 pounds.

More digger oomph, too

The digger here is Holan's 3-speed Series 5400. Maximum torque is 8,400 foot-pounds—tops by far among derrick-suspended diggers. With the power of the derrick and digger combined, you could bore through just about anything.

If you are in the market for power equipment with that extra oomph, get in touch with a Holan Field Representative.

Holan Corporation, 4100 West 150th Street, Cleveland 35, Ohio
Plants in Cleveland, Ohio; Griffin, Georgia; Phoenix, Arizona

Holan
Subsidiary of THE OHIO BRASS COMPANY
HOLAN

For phone number of closest representative see advertising index in back of book.

Specify

safety, simplicity, ease of installation and maintenance with G&W high voltage (69 to 230kv) cable terminating devices

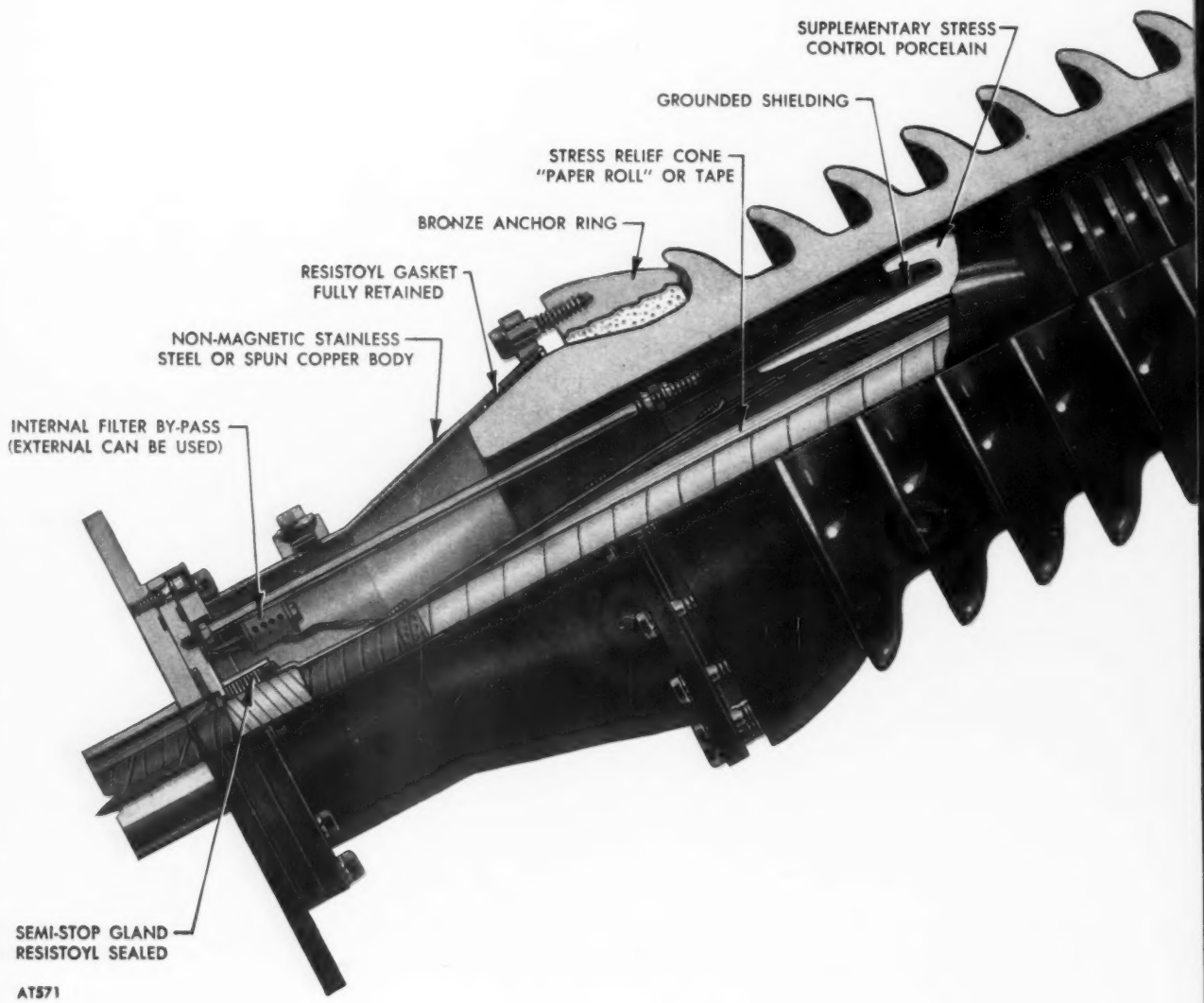
FEATURES

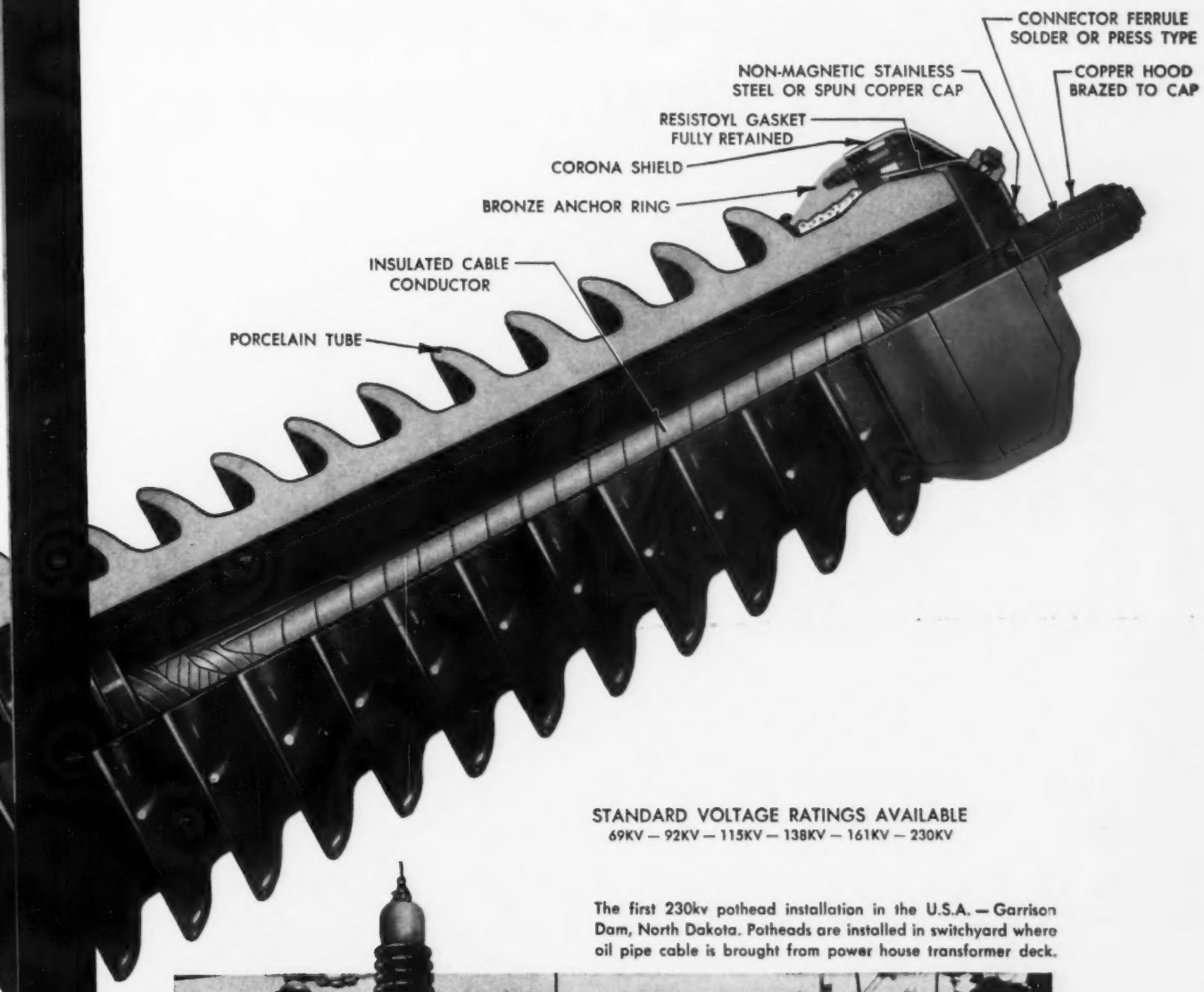
- SIMPLICITY — A minimum of parts, each designed for maximum function.
- VERSATILITY — Method of fabricating base readily adapts it to varying installation conditions.
- NO CASTINGS — Points withstanding pressure, top and bottom fittings, are fabricated non-magnetic stainless steel and spun copper to eliminate hazardous brittle, porous nature of castings that are susceptible to leaks.

- G&W tests exceed A.I.E.E. withstand tests

230kv pothead terminating 1/C, 500mcm, 230kv, PILC, HPOF cable	A.I.E.E. No. 48	Actual Tests
Impulse, 1.5 x 40ms	1050kv	1232kv
60 cycle, 1 minute dry	545kv	575kv
60 cycle, 10 seconds wet	445kv	545kv
60 cycle, 6 hours dry	315kv	340kv

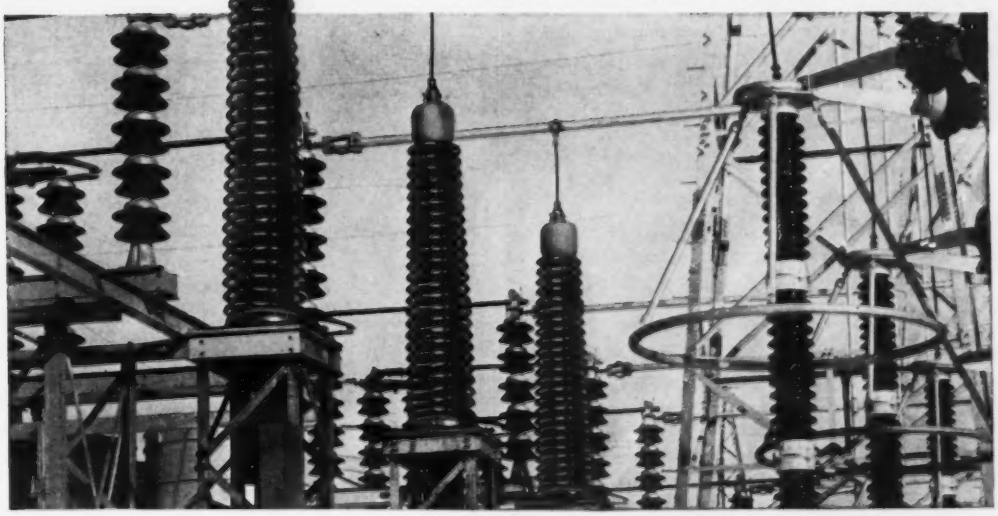
The sound engineering principles of G&W potheads will eliminate the complexities of your cable terminating problems. Their safety, ease of installation and minimum maintenance are essential requirements in which you'll be interested. Notice the features and overall design pioneered by G&W. Specify them with confidence in your plans for high or low pressure oil or gas filled cable systems.


SUPPLEMENTARY STRESS CONTROL PORCELAIN
GROUNDED SHIELDING
STRESS RELIEF CONE "PAPER ROLL" OR TAPE
BRONZE ANCHOR RING
RESISTOYL GASKET FULLY RETAINED
NON-MAGNETIC STAINLESS STEEL OR SPUN COPPER BODY
INTERNAL FILTER BY-PASS (EXTERNAL CAN BE USED)
SEMI-STOP GLAND RESISTOYL SEALED
AT571



STANDARD VOLTAGE RATINGS AVAILABLE
69KV — 92KV — 115KV — 138KV — 161KV — 230KV

The first 230kv pothead installation in the U.S.A. — Garrison Dam, North Dakota. Potheads are installed in switchyard where oil pipe cable is brought from power house transformer deck.

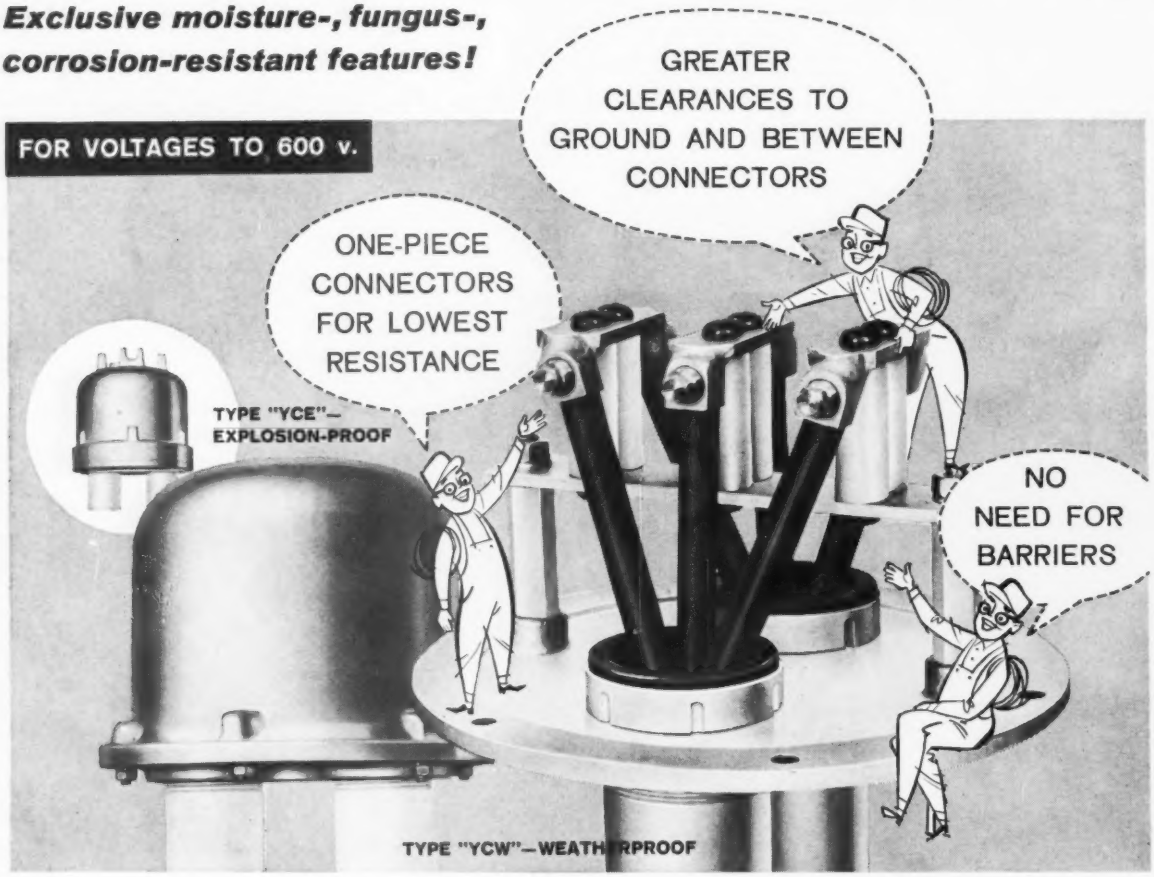


G&W ELECTRIC SPECIALTY COMPANY
3500 W. 127th ST., BLUE ISLAND, ILLINOIS

For phone number of closest [illegible] see our ad in the index in back of book.

NEW! O.Z. PULL-N-SPLICE BOXES! CONVENIENT·COMPACT·ECONOMICAL

Exclusive moisture-, fungus-, corrosion-resistant features!


FOR VOLTAGES TO 600 v.
GREATER CLEARANCES TO GROUND AND BETWEEN CONNECTORS
ONE-PIECE CONNECTORS FOR LOWEST RESISTANCE
NO NEED FOR BARRIERS
TYPE "YCE"— EXPLOSION-PROOF
TYPE "YCW"—WEATHERPROOF

O.Z. Pull-n-Splice Boxes mark a significant advance in pull box construction!

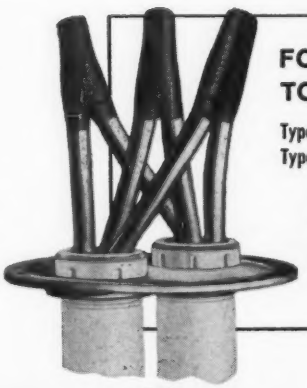
Their highly compact size saves *more space than ever!*

Their more efficient design means *new savings in installation time and labor!*

Their moisture-, fungus-, and corrosion-resistant features mean long, trouble-free service.

Still, with all their features, the new O.Z. Pull-n-Splice Boxes are *smaller* — and *cost far less* than conventional pull boxes . . . even late model *competitive* types! And, you get a bonus in high quality materials and workmanship so characteristic of *all* O.Z. products!

For complete information on these and the many other O.Z. products that mean more for you, call your local O.Z. distributor, or write to the company.



FOR VOLTAGES TO 5000 v.

Type "YPW" — Weatherproof
Type "YPE" — Explosion-proof

Deeper dome than "YCW" and "YCE". Furnished without connector panels. Insulated pigtail splices recommended.

O.Z. ELECTRICAL MANUFACTURING CO., INC.
262 BOND STREET • BROOKLYN 17, N. Y.

- CAST IRON BOXES
- CABLE TERMINATORS
- POWER CONNECTORS
- SOLDERLESS CONNECTORS
- GROUNDING DEVICES
- CONDUIT FITTINGS
- INTERLOCKED ARMOR CABLE FITTINGS

Sales Office and Warehouse: 406 So. Cicero Avenue, Chicago 44, Ill. • ESterbrook 9-0326
Office and Factory: 749 Bryant Street, San Francisco 7, Calif. • GArfield 1-7846

ALLIS-CHALMERS ANNOUNCES

ALL-NEW JFR REGULATOR

Lower, lighter up to 40%!
For use anywhere in your system

1. Electrical resettable drag hands on position indicator, reset from push button in control panel.
2. Oil-sight gauge in tank wall reveals oil level at all times.
3. Horizontal *external* by-pass arrester offers high-voltage protection.
4. Easily read, six-digit, direct-reading counter records JFR's life history to one million operations.

. . . And 19 more customer benefits.

Where to get more JFR regulator facts fast—Bulletin 21B7977E.

Call, write or wire...

NATIONAL ELECTRICAL WEEK
FEBRUARY 7-13, 1960

A-1218

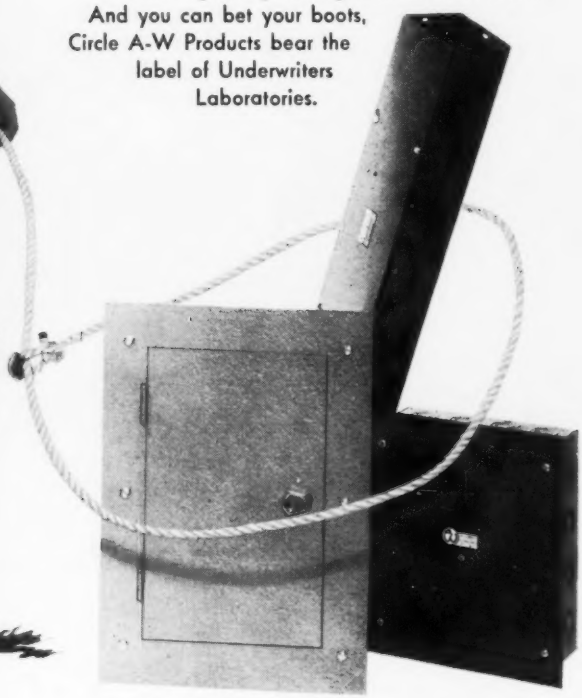
ALLIS-CHALMERS

"Originators of 5/8% Step Regulators"

For phone number of closest representative see advertising index in back of book.

"there's no trick to it!"

We've had this pretty young miss round up three of our oldest products --- telephone cabinet, screw cover can, and screw cover gutter --- as a reminder that there is no trick to the consistent quality found in all Circle A-W Products, old or new. It's there because of our years of experience and the rigid engineering standards we follow. And you can bet your boots, Circle A-W Products bear the label of Underwriters Laboratories.



Circle A-W Products Manufactured by **Alwalt Manufacturing Company**

WIRING GUTTER AND FITTINGS
TRANSFORMER CABINETS
HINGE COVER-BOXES
UTILITY BOXES
HINGE COVER WIREWAY AND FITTINGS

KEEP PACE ELECTRICALLY

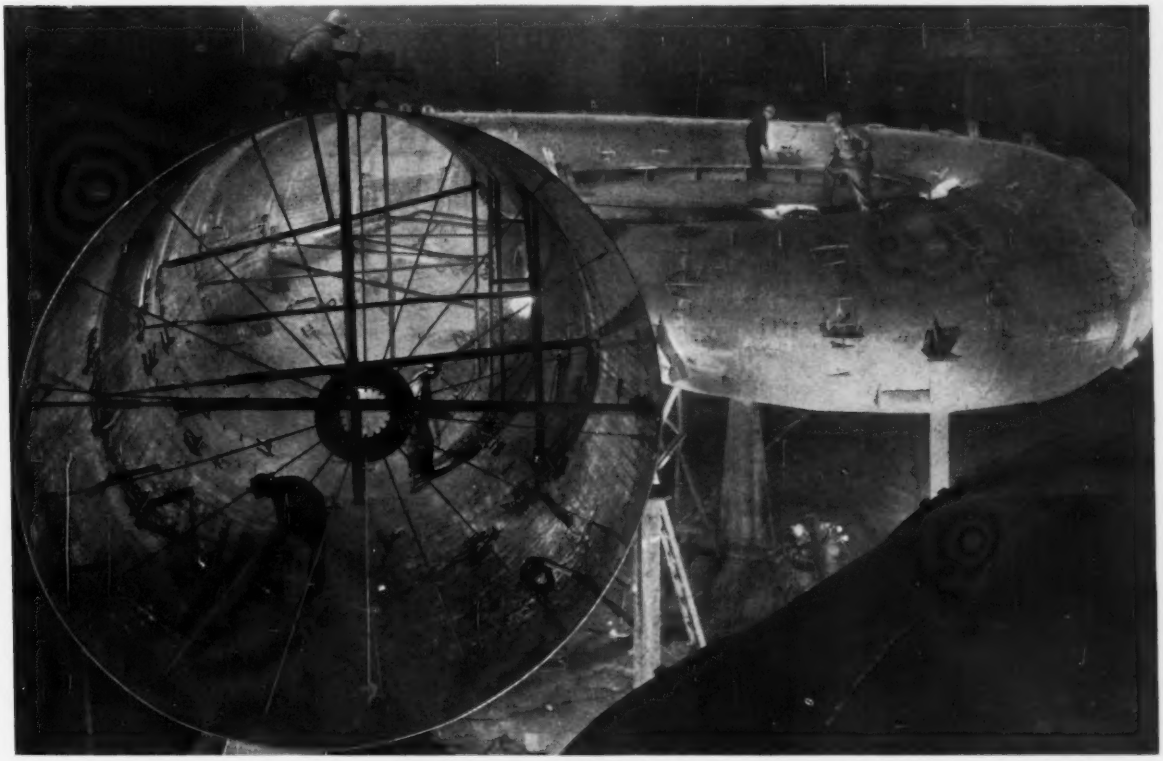
METER AND BREAKER ASSEMBLIES
SCREW COVER-BOXES
WEATHERPROOF BOXES
CABINET BOXES
METER TROUGHS

CIRCLE A-W PRODUCTS Co.
P.O. Box 1171, Modesto, Calif.

For phone number of closest representative see advertising index in back of book.

ALLIS-CHALMERS

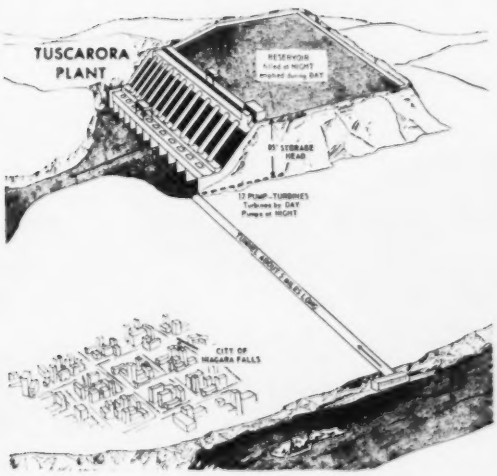
A-1231



THE BIGGEST MADE IN THE U.S.A., this reversible pump-turbine scroll case has inlet diameter of 18 ft, measures 56 ft across. It's designed for one of Tuscarora's 12 Allis-Chalmers pump-turbines.

Now building 12 reversible pump-turbines for Tuscarora—

world's largest pumped-storage project



Power plant by day, pumping station at night — the New York State Power Authority's Tuscarora plant will capitalize on the hydroelectric power potential of the Niagara River without adversely affecting the scenic beauty of the Falls.

The largest project of its kind, Tuscarora will have 12 reversible pump-turbines . . . all designed and fabricated by Allis-Chalmers. As a turbine, each of these units is rated at 28,000 hp under 75-ft head. In reverse, as a pump, each is rated at 3400 cfs against 85-ft head. All will be direct-connected to Allis-Chalmers generator-motors — rating 25,000 kva at .8 P.F. as generators . . . 37,500 hp at 100% P.F. in reverse as motors.

The selection of Allis-Chalmers to design and build the above components came naturally. A-C is the only builder of complete reversible pump-turbine installations — with a record that includes the world's largest pumped-storage projects.

Look to Allis-Chalmers for leadership in the design, engineering and manufacture of hydraulic turbines and necessary accessories such as valves, pumps, trash rakes, water control gates and hoists. *For information, contact your nearby A-C office . . . or write* **Allis-Chalmers,** *Hydraulic Division, York, Pa.*

When **M** STRANDS go up

your costs come down

It's true economy to install guys and messengers made of Copperweld Type M Strand. There are no maintenance costs—no replacement costs. Because Type M Strand is non-rusting, you eliminate, once and for all, the problems and expense caused by the deterioration and failure of rust-weakened guys and messengers.

Type M Strand gives you the same long life and freedom from maintenance that has distinguished Copperweld Products for over 40 years. Each wire is permanently protected against corrosion by a heavy copper sheath inseparably molten-welded to an alloy steel core. And, because of the molten-weld, the copper will not crack, flake or peel. Easy to handle—easy to install—Type M Strand can be readily bent, served, moused or clamped.

You can see that Type M Strand offers economies you can't afford to pass up. Put this strand up and prove it for yourself.

COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION **Glassport, Pa.**
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

Copperweld® TYPE M™ STRAND

FOR GUYS AND MESSENGERS

For phone number of closest representative see advertising index in back of book.

AI's extensive field laboratory is located in California's Santa Susana Mountains. *Woodcut by Edward Kysar.*

How can A.I. facilities help you plan a Nuclear Program?

In the picturesque Santa Susana mountains near Los Angeles, Atomics International has built an extensive field laboratory for research, engineering and testing in the nuclear sciences. Here, and at a headquarters complex in the valley below, men who pioneered the creative uses of atomic energy are applying their experience to develop advanced nuclear reactors and associated equipment.

Fourteen years of experience in developing various types of reactors for the Atomic Energy Commission and other organizations have given the men of Atomics International a collective background unparalleled in the industry. The facilities at their disposal are among the most sophisticated and extensive in the world.

Results of AI's work have been demonstrated in projects for the AEC which include the Organic Moderated Reactor Experiment at the National Reactor Testing Station in Idaho and the Sodium Reactor Experiment at the company's field laboratory. Additionally, AI built and is operating SNAP II, a 220 pound prototype reactor to produce three kilowatts of electricity for space vehicles.

Atomics International is also building large power reactors for electric utilities in Ohio and Nebraska under AEC programs. Studies are underway for other power reactors in the United States and Europe. Research reactors have been built by AI for Denmark, Germany, Italy, Japan, Puerto Rico and several sites in the United States.

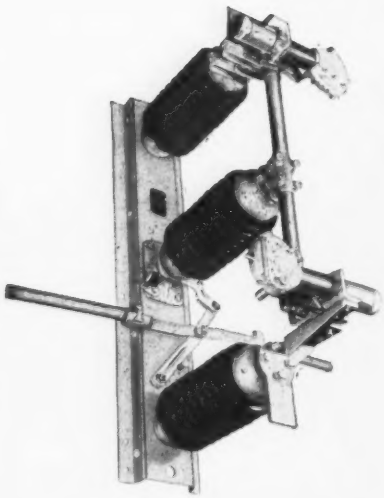
For details contact: ATOMICS INTERNATIONAL, Canoga Park, California, U.S.A. Cable address: ATOMICS.

AI **ATOMICS INTERNATIONAL**
A DIVISION OF NORTH AMERICAN AVIATION, INC.
PIONEERS IN THE CREATIVE USE OF THE ATOM

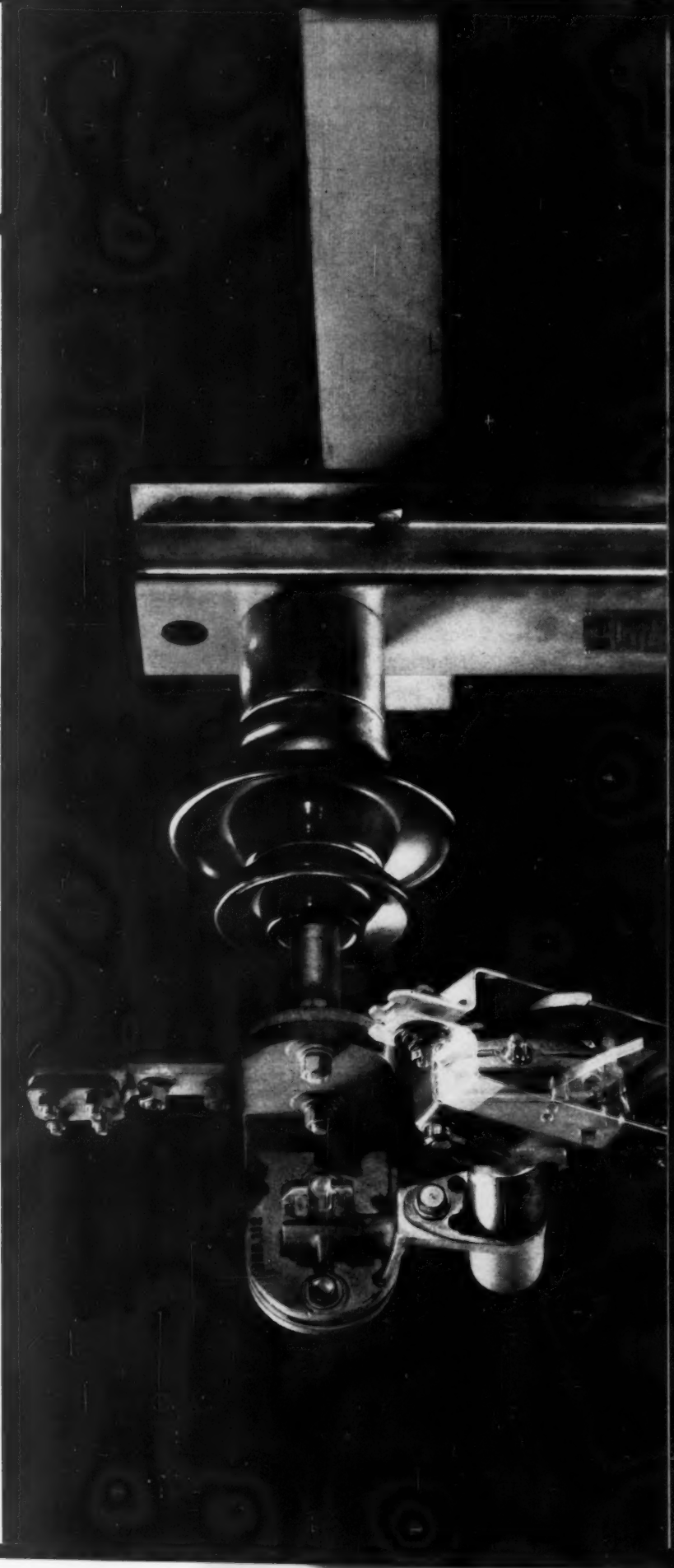
Other offices in: Washington, D.C., U.S.A.; Geneva, Switzerland. Affiliated with: INTERATOM, Bensberg/Cologne, Federal Republic of Germany and DYNATOM, Paris, France.

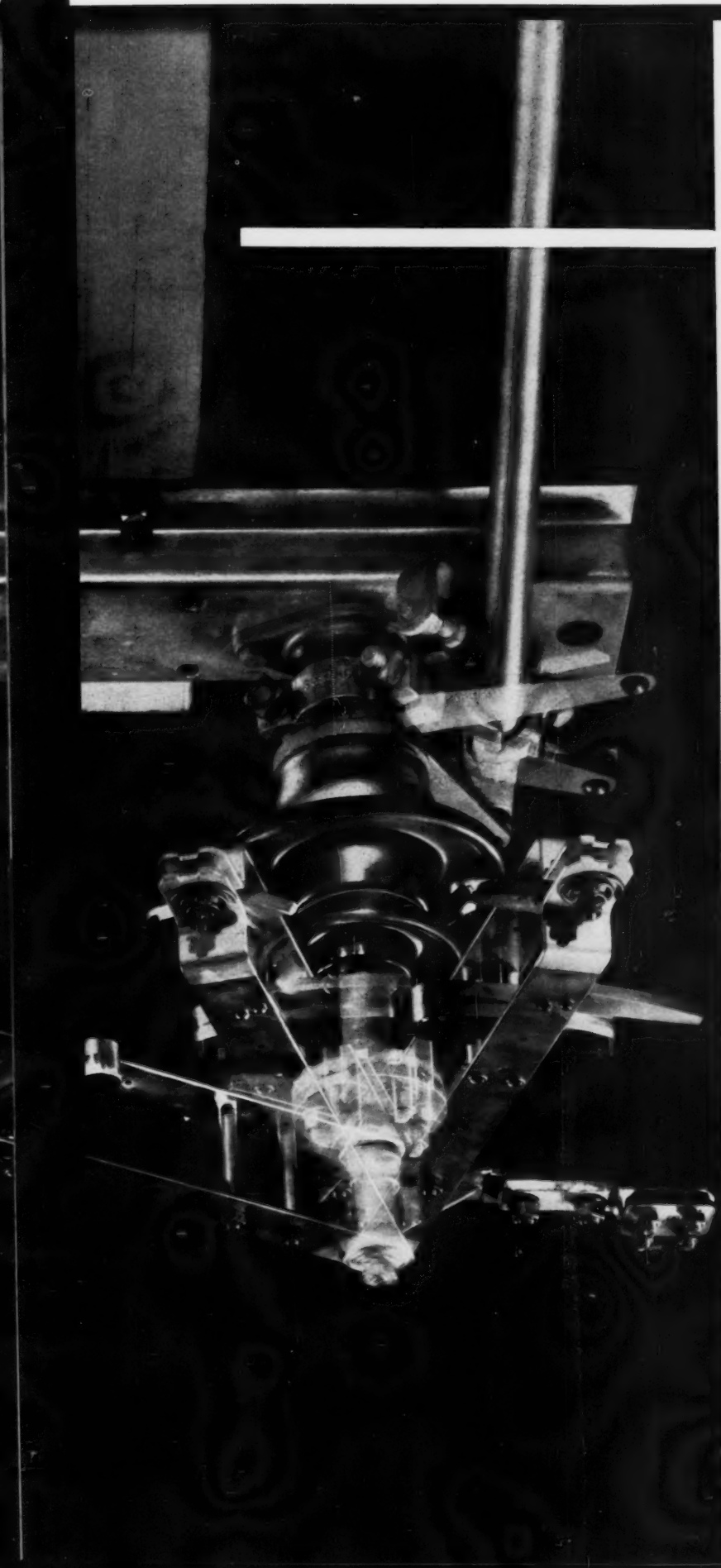
SPLIT THE LOAD

(OR EVEN DUMP IT)



Double-Break Style, 34.5 kv rating (above) and Side-Break Style, 14.4 kv rating (right)





with S&C Load Interrupters that cost no more than disconnects

Now from S&C you can get load interrupters at the same price as disconnects. This means that you can handle any kind of line switching in the simplest way at the lowest possible cost.

Here are the devices that do it:

1. The Side-Break Alduti Load Interrupter at 7.2 kv and 14.4 kv, and
2. The Double-Break Alduti Load Interrupter at 23 kv and 34.5 kv.

Both give you load dumping* (full 600-ampere arc-free load switching at full line voltage) along with loop sectionalizing (switching currents in parallel or loop circuits) and line dropping (switching line charging currents).

Since these switching duties at today's voltages and loads can't be handled by disconnects, why not compare the cost of S&C Load Interrupters with disconnects. You'll find there's no premium price for premium performance.

Here are some of the other advantages of S&C Load Interrupters:

- 600-amp load switching without line or feeder breaker openings
- a maintenance-free interrupting device
- no external arc
- can be mounted in any position . . . vertical, upright or inverted.

For more information, please contact S&C Electric Company, 4425 Ravenswood Avenue, Chicago 40, Ill.

* Important because: (1) Emergency situations (wires down, etc.) demand quick action, hence dumping the load. There is no time to set up communications for complicated breaker and switch sequencing. And (2) there's always the possibility of an operator error or misunderstanding, with the result that a loaded circuit may be dumped inadvertently.

S&C ELECTRIC COMPANY

S&C

fully adjustable, TUBULAR BUS SUPPORT*

This bus support, made of high-strength bronze throughout, has the following outstanding features:

- Fully adjustable to any angle whatsoever within a complete circle (360°).
- No need to lift bus out of support to change angular position.
- To change position within seconds, merely loosen 4 insulator mounting bolts, rotate assembly to desired angle and re-tighten bolts.
- No inaccessible internal bolt employed for angular setting.
- The only bus support whose angular adjustment does not jeopardize its overall strength.
- By reversing cap bus can be tight-mounted or slip-mounted.

Write for illustrated brochure!

*U. S. PAT. 2,861,762

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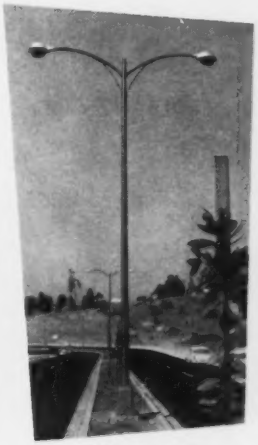

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Only active manufacturer of round tapered steel poles in the West

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No. 8

Are the appliances you want most in the new home you plan to buy?

Every MEDALLION HOME has an all-electric kitchen with electric range and oven—and more from this list of additional appliances:

Electric DRYER
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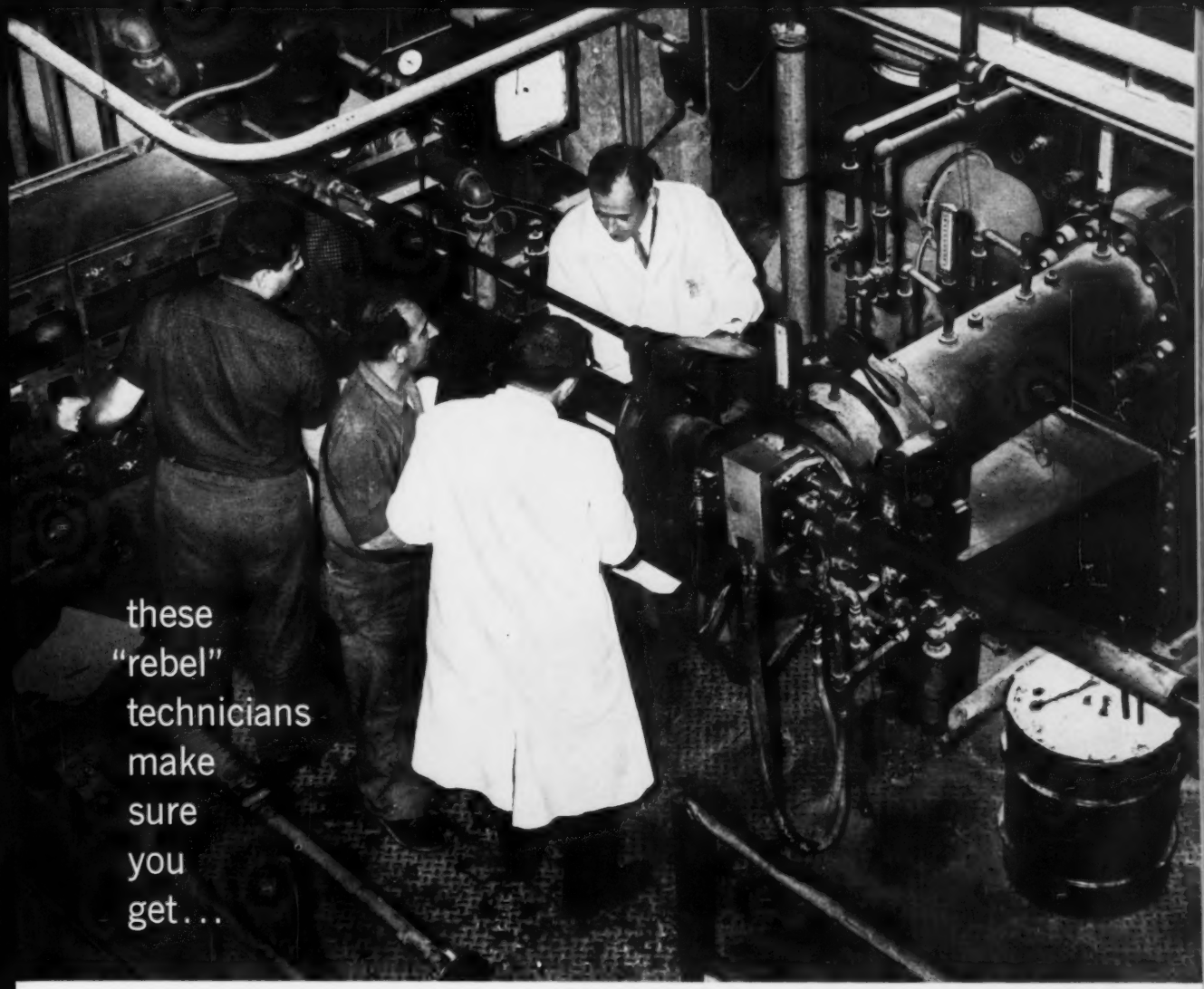
The Medallion award on a new home guarantees you major electrical appliances, already installed. And you get ample wiring ... full Housepower for future needs ... *plus* lighting which is both functional and beautiful.

So look for the Medallion—national symbol of better housing and modern electric living. It identifies today's best new-home buys in every style, size, location and price range. No family should buy a home without the Medallion Home award.

SOUTHERN CALIFORNIA Edison COMPANY *helps you* LIVE BETTER—ELECTRICALLY



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Reason: to make sure that the quality they build into a cable in the lab—is all there in the cable you buy.

That's why you'll often find them in the plant working closely with men from process control, inspection and testing. In the photo above, for example, two Circle lab men help check extruder pressure and temperature for a special butyl compound developed for high voltage power cable.

Such close cooperation between laboratory and quality control personnel is unusual in the wire and cable field. It is another reason, however, why Circle products have grown to enjoy their reputation for high quality.

Next time you buy or specify cable, we suggest you ask for Circle. There's no finer cable made.

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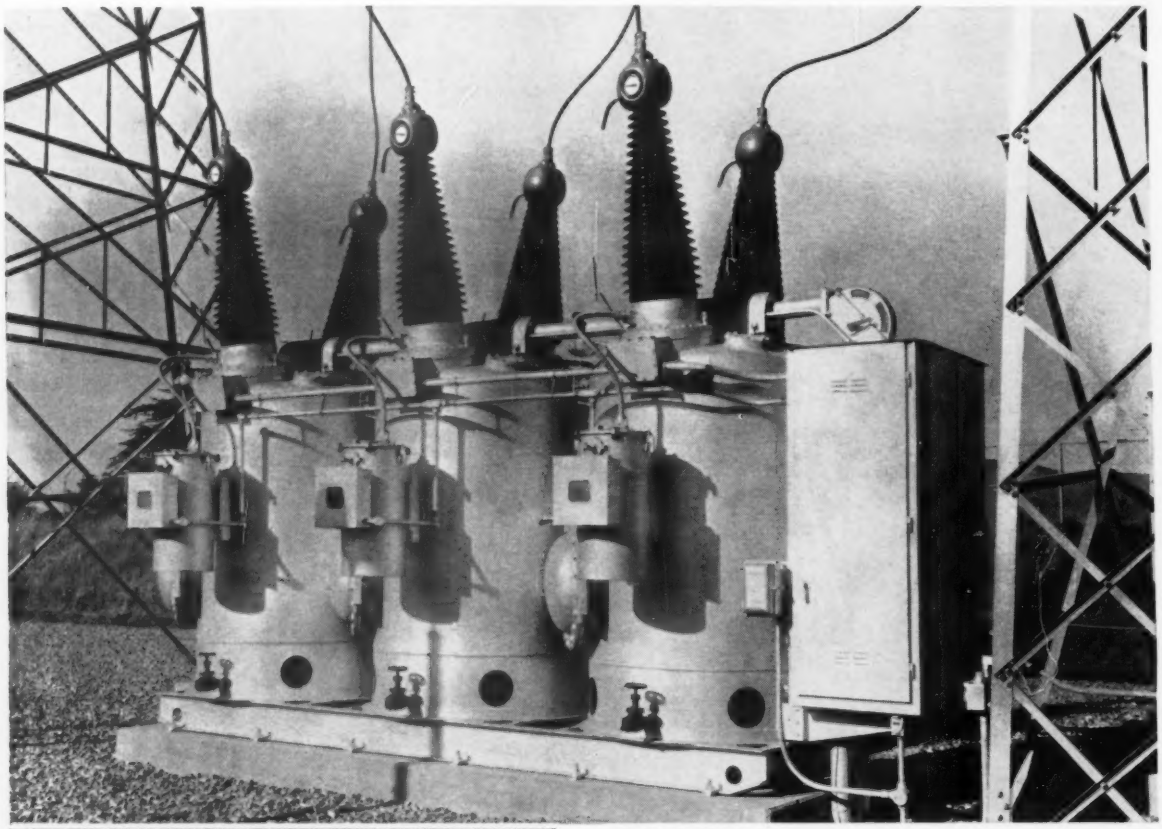
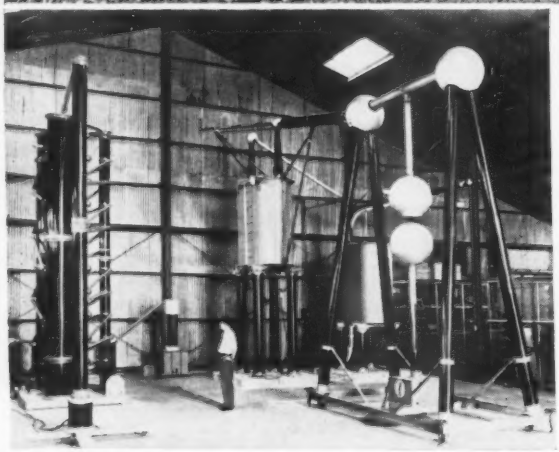
I-T-E OIL CIRCUIT BREAKERS NOW OFFERED NATIONWIDE



Typical I-T-E oil circuit breaker on 115 kv transmission circuit. Capacity is 1200 amp continuous, 3500 mva interrupting.



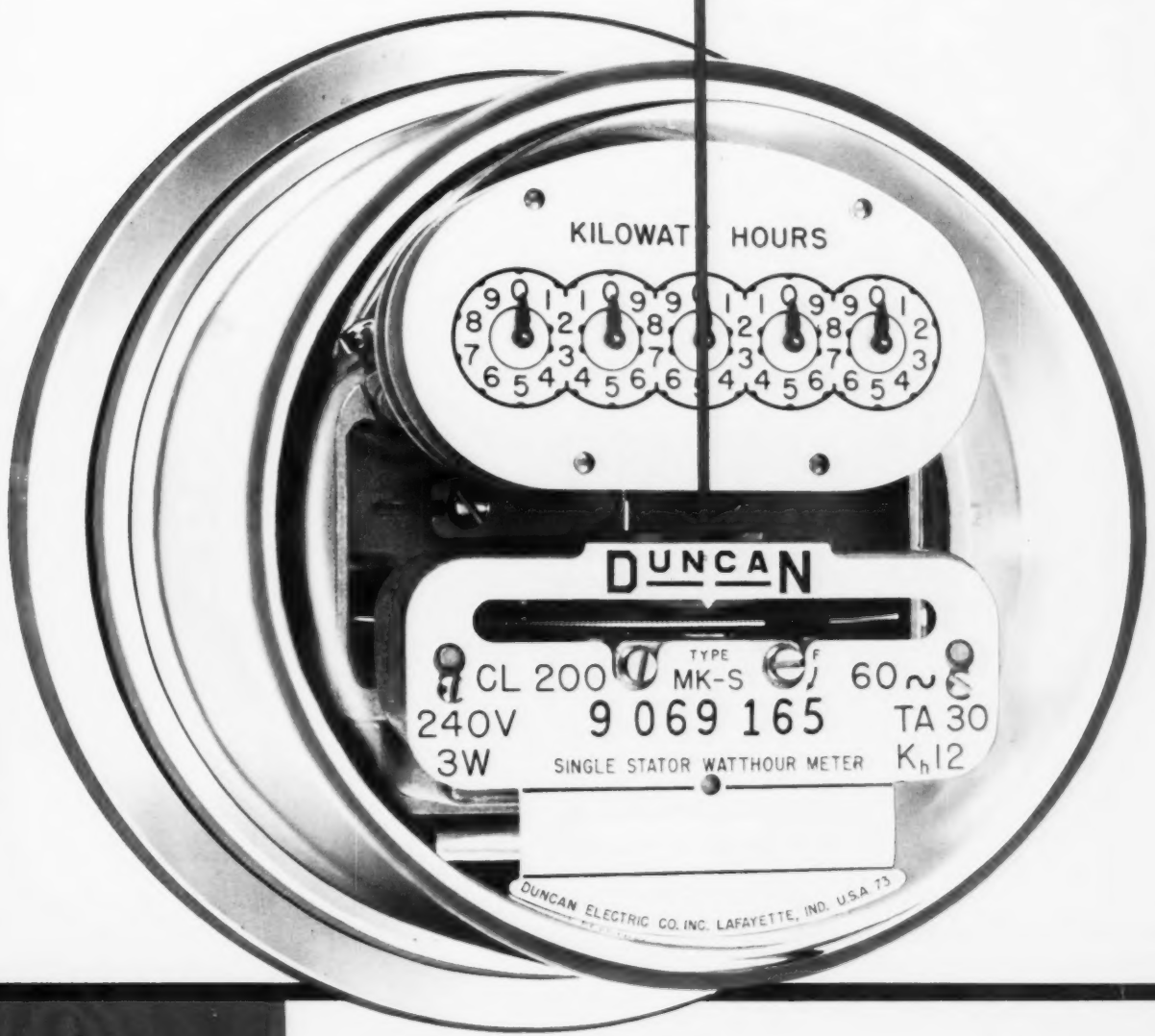
Division Test Laboratory. For testing power circuit breakers at the Los Angeles oil circuit breaker plant. Shown are 1.5 megavolt surge generator, 666 kv transformer supply, and sphere gap stand.

This new addition to I-T-E's line of products for electric utility companies is backed by over 50 years of oil circuit breaker experience. Thousands of breakers have been purchased and installed by West Coast utility companies during this period. Now they are being offered nationwide through I-T-E's coast-to-coast sales organization.

I-T-E oil circuit breakers are the product of one of the newest I-T-E divisions, the Kelman Power Circuit Breaker Division. Formerly the Kelman Electric and Manufacturing Co., it joined the I-T-E family just a few years ago. Oil circuit breakers now become full-fledged partners of the other products which I-T-E offers to utility companies: metal-clad switchgear, isolated phase bus, outdoor high voltage disconnect switches, and outdoor substations.

I-T-E is ready to serve your needs anywhere. Improved and expanded facilities for producing and testing oil circuit breakers insure prompt delivery and highest quality. Ratings range from 14.4 kv to 230 kv and from 100 mva to 15,000 mva. Get complete information from your local I-T-E representative. Or write I-T-E Circuit Breaker Company, Kelman Power Circuit Breaker Division, 1667 North Main Street, Los Angeles 12, Calif.

I-T-E CIRCUIT BREAKER COMPANY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DUNCAN Concentrates on Metering Equipment – the attention of the entire Duncan Organization is devoted to your metering requirements.

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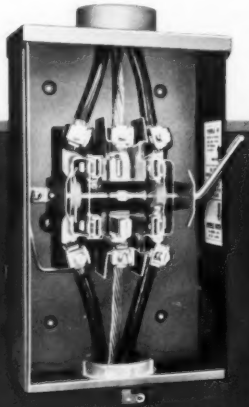
Classes represent maximum current for each rating — 10 amperes for Instrument Transformers, 100 and 200 amperes self-contained for corresponding services. For today's growing loads, Class 200 should be considered for general purpose self-contained installations.

Type MK represents the latest carefully engineered product in a long line of DUNCAN developments . . . built to accurately meter a wide range of loads up to 200 amperes. Damping is provided by two high energy *Alnico* magnets, above and below the disc, insuring calibration stability and substantial freedom from tilt error. Arc-resistant insulation and self-contained arc gaps by-pass electrical disturbances.

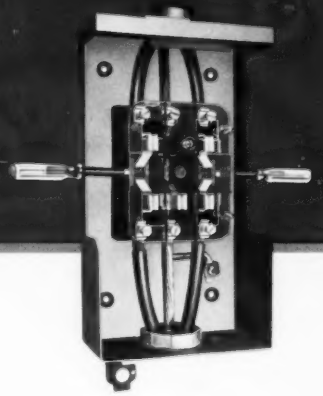
Simplification of design results in a minimum number of parts, improving reliability and reducing the necessity for repairs, but making any needed maintenance convenient. A three-position cover ring . . . worm wheel mesh, independent of the register . . . and all adjustments accessible from the front, make the MK a convenient meter.

meet increasing loads

with DUNCAN Extended Range Single Phase Meters and Mounting Devices with 200 Ampere Capacity.



For sustained or "high load factor loads" up to 200 amperes capacity. **HQ-5** **HQ-7**



For diversified demand or "low load factor loads" — *Up to* *200 amperes* **MD-5**, *175 amperes* **MD-7**

LIVE BETTER ELECTRICALLY WITH FULL HOUSEPOWER

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DUNCAN ELECTRIC CO., INC.
LAFAYETTE, INDIANA

ELECTRICAL WEST SPOKESMAN FOR MOST HIGHLY ELECTRIFIED REGION OF THE U. S VOL. 124, NO. 2 FEBRUARY 1960

1.05 billion in the 13 Western States
Over 100 million in Western Canada
give Western utilities their . . .

BIGGEST BUDGET EVER

Electric utility construction expenditures will reach an all-time high—$1.05 billion—up 11.5% from 1959's actual expenditures of $940 million. These figures grow out of an exclusive ELECTRICAL WEST survey covering 58 Western utility organizations representing more than 95.4% of the installed meters in the area. Increased budgets were reported by 78% of these organizations, a fact which corroborates the indications given by Western purchasing agents in the January issue.

The figures quoted in this issue have been corrected to represent 100% of the meters in the West.

By far the most significant aspect of the boom in Western spending is that Western spending is up, and up 11.5%, at a time when national utility construction has been predicted to have a budget increase of 4.9%. In 1960 Western spending will represent 21.4% of the national total, the largest share of the market ever enjoyed by the West.

Even though there is no assurance that the $1.05 billion will be actually spent, it is budgeted, and much of it committed as payment for the 3 million new kw of generation that will come on Western systems during the coming year.

A noteworthy difference exists between 13 Western state spending as reported in *Electrical World*'s Jan. 25 issue and the figures reported in this issue. Most likely time is the cause of the difference. ELECTRICAL WEST reports were due Jan. 5, with a few not received until the 15th. Thus, the figures you see are, on reading, a month old. That they are appreciably larger than reported in an earlier survey is perhaps a clue to the economic climate of the early '60s.

In 1960 the utility construction budget will be spent as follows:

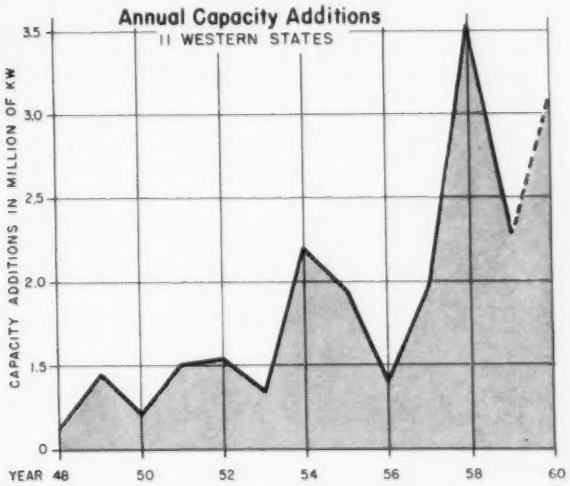
Generation	42.6%
Transmission	15.5%
Distribution	29.8%
Maintenance and Misc.	12.1%

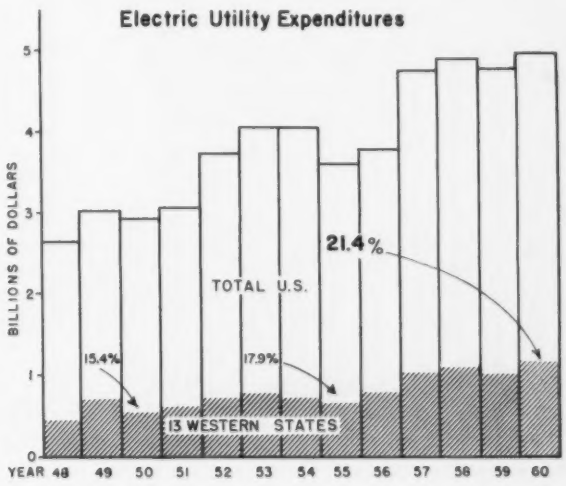
The distribution of expenditures shows federal spending up (see chart) 55% over 1959—a sharp break in the trend of the past few years. Municipal expenditures show a long-term increase, mostly as a result of the PUDs' construction on the upper Columbia.

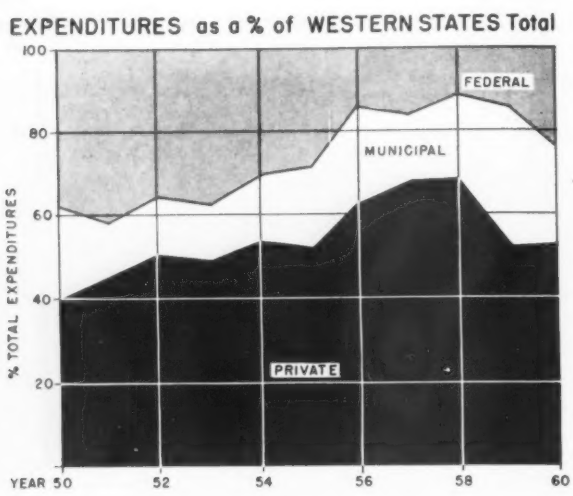
Generation

The Calendar of Generation (p 56) shows the planned generation additions through 1965. The addition of 3 million kw of capacity during 1960, while a sizable jump over '59 (2,250,000 kw), is still short of 1958's bumper crop of 3.5 million kw. The five-year total is up 1.7 million kw over last year's total. Much of this increase falls in 1962 where firm plans have increased from 1.3 million kw last year to 2.25 million kw.

Even though there is no assurance that the $1.1 us 9 million kw short in 1965. This statement is based







on growth during the next five years at the same rate that we have experienced during the past decade. Since a minimum of two years will be required to put plants in place, it would seem that this additional capacity will have to materialize in the next two and a half to three years. Because the approval and construction cycle for major hydro projects is close to five years, it seems reasonable that much of the 9 million kw deficit will be steam generation using either nuclear or fossil fuel.

Transmission

Transmission construction during 1960 will be up a walloping 33%. Major contributors to this resurgence in transmission construction are the federal agencies, whose 1960 construction will be five times that accomplished in 1959.

The addition of transmission substation capacity will grow from 2.7 million kva to 2.9 million kva during the year.

Distribution

Distribution line mile construction is up slightly, 6,780 miles over 6,670 miles put in place in 1959. Distribution substation capacity, on the other hand, shows a surprising jump from 1.8 million kva in '59 to 2.5 million kva in '60—an increase of 40%.

Western Canada

Spending in Western Canada also shows an increase—nearly 15% over 1959. Total spending in Western Canada during the forthcoming year will approximate $105 million. Even this spectacular increase may pale if the giant Peace River Development becomes a reality, or if international agreement is reached on downstream benefits so that construction on the Canadian section of the Columbia will begin. Details of this increased Canadian construction are shown in the accompanying table.

Non-Utility Construction

For those who want figures—contractors must like them, they do so much figuring—the statistical horizon has been swept by the eyes of the editors to report in this survey issue. Unfortunately for scanning, the building construction business in all of its multiplicity of phases is not one to linger and check up on its past performance. Its eyes are on the next job to be figured—and if possible on the competitor's figures.

Total building in dollar cost is estimated to equal that of 1959 or surpass it by 1 or 2%, nationally. The increase in dollar cost may just offset the inflation, so the actual work in place may not exceed that in 1959. But that was a substantial amount and should assure equal business opportunity and employment.

Residential building is estimated in national forecasts to be down 6% in 1959 from 1958 and may be 8% below in 1960. Regionally the picture may well be better. In the Utah mountain area, home building was up 4% last year from 1958 whereas all building was down 16%. But Utah was hard hit by the extended copper and steel strikes. For 1960 opinions differ as to the potential. A number of large new downtown buildings are expected to start in Salt Lake City and the missile program, if continued, promises to expand building in other parts of the region. However, opinions as to home building are less optimistic unless the missile program brings larger employment and hence need for housing.

For the West as a whole, estimates range from 6 to 20% below last year, depending upon local conditions such as industry, the defense program and population movement. Credit easing may make more business. More of the residential construction will be in apartments rather than individual houses.

Commercial and industrial building is being predicted to be on the increase for the West this year in percentages from 7 to 20%. Here again local factors must be used to correct such estimates. Schools will continue to represent about the same total volume but not in the same areas. There is no doubt about the need for more classrooms but the voters have not always passed bond issues required to finance their construction. In some areas a long-range program may be winding up and in others just starting. Of a certainty, politics will rage in Washington for more federal financing.

SUMMARY OF UTILITY CONSTRUCTION
13 WESTERN STATES

	1959	1960	% Change
Expenditures (millions)	940	1,050	+11.5
Transmission line construction (miles)	2,170	2,900	+33.0
Transmission substation capacity (mw)	3,740	3,920	+ 5.0
Distribution line construction (miles)	6,670	6,780	+ 2.0
Distribution substation capacity (mw)	1,800	2,540	+41.0

SUMMARY OF UTILITY CONSTRUCTION
WESTERN CANADA

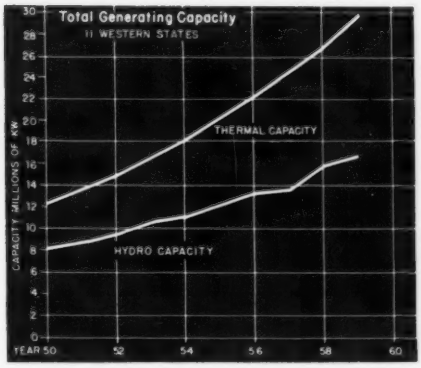
	1959	1960	% Change
Expenditures (millions)	91.3	104.7	+15.0
Capacity additions (kw)	318,450	292,800	— 8.0
Transmission line (miles)	490	580	+18.0
Transmission substation capacity (kva)	459,000	131,000	—71.5
Distribution line (miles)	685	890	+30.0
Distribution substation capacity (kw)	184,250	111,500	—29.0

A STATISTICAL REVIEW OF 1959

COMPARISON OF WESTERN TO NATIONAL OPERATIONS FOR 1958 AND 1959

	11 Western States		United States		% West
	1958	1959*	1958	1959*	to U. S.
Energy generated (thousands of mwh)	122,819	**135,813**	644,760	**707,500**	19.2
Energy generated hydro (thousands of mwh)	81,697	**81,905**	140,047	**135,800**	60.3
Energy generated fuel (thousands of mwh)	41,122	**53,908**	504,713	**571,700**	9.4
Per cent hydro to total	66.4%	**60.3%**	21.7%	**19.2%**	
Total installed capacity (mw)	26,921	**28,839**	142,413	**164,800**	17.5
Hydro capacity (mw)	15,698	**16,754**	29,363	**30,900**	54.2
Fuel capacity (mw)	11,223	**12,085**	113,050	**133,900**	9.0
Number of customers	8,754,107	**9,084,547**	56,208,491	**57,495,450**	15.8

*Electrical West projections based on EEI and FPC figures through November 1959.
Alaska and Hawaii will be included as soon as industry statistics reflect their statehood.



GENERATION CAPACITY BY STATES, 1959

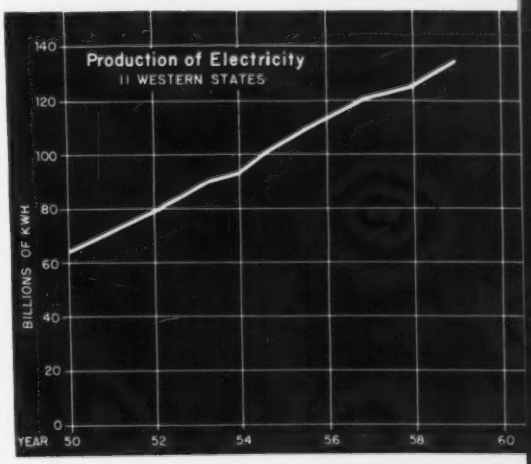
(GENERATOR CAPACITY IN MEGAWATTS)

	Hydro Power	Steam Power	Total Capacity	% Western Capability
Arizona	980	915	**1,895**	6.6
California	3,787	8,276	**12,063**	41.8
Colorado	252	951	**1,203**	4.2
Idaho	1,163	4	**1,167**	4.1
Montana	1,099	119	**1,218**	4.3
Nevada	587	116	**703**	2.4
New Mexico	25	651	**676**	2.2
Oregon	2,762	204	**2,966**	10.3
Utah	100	516	**616**	2.1
Washington	5,844	241	**6,085**	21.1
Wyoming	155	92	**247**	0.9
11 Western States	16,754	12,085	**28,839**	100.0

GENERATION RECORD BY STATES

(IN THOUSANDS OF MWH)

	1950	1955	1958	1959	% West. States
Arizona	3,489	5,537	7,650	**8,420**	6.2
California	24,836	42,517	50,724	**58,081**	42.8
Colorado	1,856	3,717	4,524	**4,786**	3.5
Idaho	2,538	3,906	5,010	**6,356**	4.7
Montana	3,136	4,696	4,551	**5,059**	3.7
Nevada	3,210	1,431	2,903	**2,595**	1.9
New Mexico	1,014	1,761	2,640	**2,972**	2.2
Oregon	5,554	12,668	13,263	**13,578**	10.0
Utah	659	2,370	2,875	**2,847**	2.1
Washington	17,371	23,908	27,770	**29,667**	21.8
Wyoming	595	725	909	**1,452**	1.1
Total	64,258	103,236	122,819	**135,813**	100.0



CALENDAR OF GENERATION

1960—Fuel Generation Planned

Agency	Plant	Size—Kw
Anchorage L&P Dept. ***	(Unnamed)	1,000
Arizona PS	Octillo, Units No. 1 & 2	220,000
B. C. Power Comm. ***	Burns Lake	1,000
B. C. Power Comm. ***	Dawson Creek	3,000
B. C. Power Comm. ***	Port Hardy	1,100
B. C. Power Comm. ***	Prince George	6,000
B. C. Power Comm. ***	uesnel	3,000
Edmonton EL&P Dept.	(Unnamed)	75,000
Pacific P&L	Dave Johnston No. 2	100,000
PG and E **	The Geysers	12,500
PG and E	Pittsburg No. 5	325,000
PS of Colorado	Cameo No. 2	44,000
PS of New Mexico	Reeves	44,000
San Diego G&E	South Bay No. 1	136,500
So. Calif. Edison	Huntington Beach No. 3	210,000
Tucson GEL&P	Tucson No. 4	75,000
	Total	**1,257,100**

1960—Hydro Generation Planned

Agency	Plant	Size—Kw
Army Eng.	The Dalles (4 units)	312,000
B. C. Electric	Bridge River No. 2	124,000
Calgary Power	Rundle	30,000
Calgary Power	Spray	50,000
Chugach Electric Assn.	Cooper Lake	15,000
City of San Francisco	Cherry Project	135,000
Grant County PUD	Priest Rapids (7 units)	551,950
Puget Sound P&L	Lower Baker	64,000
Sacramento MUD	Jaybird No. 1	67,000
Seattle City Light	Gorge	57,000
So. Calif. Edison	Mammoth Pool Nos. 1 & 2	129,360
Tacoma City Light	Mayfield (3 units)	120,000
USBR	Fremont Canyon	48,000
Washington Water Power	Noxon Rapids No. 4	84,000
Total for 1960 3,044,410	**Total**	**1,787,310**

1961—Fuel Generation Planned

Agency	Plant	Size—Kw
B. C. Electric	Burrard	157,500
Calif. Elec. Power	Cool Water	64,500
Canadian Utilities *	Vermilion	30,000
Hawaiian Electric	Waiau No. 6	50,000
PG and E	Pittsburg No. 6	325,000
Salt River Project	Agua Fria No. 3	163,200
So. Calif. Edison	Huntington Beach No. 4	210,000
So. Colorado Power	(Unnamed)	22,000
So. Nevada Power	Clark No. 3	66,000
	Total	**1,088,200**

1961—Hydro Generation Planned

Agency	Plant	Size—Kw
Army Eng.	Hills Creek	15,000
Army Eng.	Ice Harbor (3 units)	270,000
Calif. Oregon Power	Aspen Lake	36,000
Chelan County PUD	Rocky Reach (6 units)	642,000
Idaho Power	Oxbow	190,000
Ketchikan PU	Lake Whitman (2 units)	4,000
USBR	Boulder Canyon	95,000
USBR	Lower Molina	4,860
USBR	Upper Molina	8,640
Total for 1961 2,353,700	**Total**	**1,265,500**

1962—Fuel Generation Planned

Agency	Plant	Size—Kw
Arizona PS	Octillo	110,000
B. C. Electric	Burrard	157,500
Calgary Power	Wabamun	150,000
L. A. Dept. of W&P	Haynes No. 1	200,000
PG and E ****	Humboldt Bay No. 3	60,000
PS of Colorado	Cherokee No. 3	150,000
PS of New Mexico	Reeves	66,000
San Diego G&E	South Bay No. 2	136,500
So. Calif. Edison	Alamitos No. 3	300,000
So. Calif. Edison	(Unnamed)	300,000
	Total	**1,630,000**

1962—Hydro Generation Planned

Agency	Plant	Size—Kw
Army Eng.	Cougar	25,000
Army Eng.	Hills Creek	15,000
Calif. Oregon Power	Salt Caves	80,000
Chelan County PUD	Rocky Reach	107,000
Eugene W&E Board	Carmen-Smith	90,000
PG and E	Kings River	42,000
PG and E	Stanislaus (replacement)	80,000
Sacramento MUD	Camino	86,000
Sacramento MUD	Jaybird No. 2	67,000
Sacramento MUD	Union Valley	33,000
Total for 1962 2,255,000	**Total**	**625,000**

1963—Fuel Generation Planned

Agency	Plant	Size—Kw
Arizona PS	Four Corners	350,000
Arizona PS	Yuma-Axis	75,000
Edmonton EL&P Dept.	(Unnamed)	75,000
Hawaiian Electric	(Unnamed)	50,000
L. A. Dept. of W&P	Haynes No. 2	200,000
L. A. Dept. of W&P ****	(Unnamed)	50,000
Pasadena L&P Dept.	Glenarm	60,000
PS of Colorado	(Unnamed)	150,000
Utah P&L	Kemmerer No. 1	150,000
	Total	**1,160,000**

1963—Hydro Generation Planned

Agency	Plant	Size—Kw
B. C. Power Comm.	Pyramid Mt.	30,000
Calgary Power	Big Bend	150,000
Calif. Oregon Power	Keno	48,000
Grant County PUD	Wanapum	166,250
Grant County PUD	(Unnamed)	83,125
Oroville Wyandotte ID	Forbestown	27,000
Oroville Wyandotte ID	Kelly Ridge	10,000
Oroville Wyandotte ID	Woodleaf	49,000
Portland GE	Round Butte	247,050
Tacoma City Light	Mossyrock	75,000
USBR	Clear Creek	130,000
USBR	Flaming Gorge (2 units)	108,000
USBR	Lewiston	850
USBR	Spring Creek	143,000
USBR	Trinity	96,000
Total for 1963 2,523,275	**Total**	**1,363,275**

1964—Fuel Generation Planned

Agency	Plant	Size—Kw
B. C. Electric	Burrard	157,500
Burbank PS Dept.	Olive Ave. No. 2	44,000
Canadian Utilities	Battle River	33,000
Glendale	Glendale	44,000
PS of New Mexico	Reeves	66,000
	Total	**344,500**

1964—Hydro Generation Planned

Agency	Plant	Size—Kw
B. C. Power Comm.	Kokish	38,000
Calif. Oregon Power	Bear Springs	25,000
Grant County PUD	Wanapum (6 units)	498,750
Tacoma City Light	Mossyrock (2 units)	150,000
USBR	Glen Cnayon (2 units)	337,500
Total for 1964 1,393,750	**Total**	**1,049,250**

1965—Fuel Generation Planned

Agency	Plant	Size—Kw
Edmonton EL&P Dept.	(Unnamed)	75,000
Imperial ID	El Centro	75,000
PS of Colorado	(Unnamed)	150,000
Utah P&L	Kemmerer No. 2	150,000
	Total	**450,000**

1965—Hydro Generation Planned

Agency	Plant	Size—Kw
B. C. Power Comm.	Stamp River	25,000
Calif. Oregon Power	Iron Gate	25,000
Calif. Oregon Power	Warm Springs	38,000
Douglas County PUD	Wells (6 units)	421,000
Grant County PUD	Wanapum	83,125
Ketchikan PU	Beaver Falls (2 units)	4,000
Seattle City Light	Boundary	540,000
USBR	Burns Creek	90,000
USBR	Glen Canyon (3 units)	337,500
	Total	**1,563,625**
	Total for 1965	**2,013,625**
	Grand Total '60 through '65	**13,583,760**

*Gas Turbine— **Geothermal — ***Diesel — ****Nuclear

Hospital and public building construction is expected to increase by many forecasters. With the growing electrical facilities that go into such buildings, these jobs represent more electrical dollars of the total.

Road and highway construction of itself does not represent a large electrical percentage but the impact of such roads on the towns they tear up and go through represents a lot of collateral electrical construction for relocating of businesses and homes, as well as roadside service facilities. The road program for 1960 will about equal that in 1959 which, however, was down a bit from 1958. The increase in gas tax will help to restore the volume.

Military and defense expenditures for construction are hard to predict in today's quickly changing strategy. The sudden shift from aircraft to missiles was a body blow to aircraft industry centers such as Los Angeles, San Diego, Seattle and Phoenix while it was a bonanza to Salt Lake City, Santa Maria, Sacramento and Sunnyvale. The policy changes with Mr. K's speeches. That's all the help we can offer you.

Construction materials figures are good clues. The Department of Commerce, which receives figures from all types of distributors, says that assuming all types of construction activity will increase by 2% in 1960, sales of electrical construction materials should increase by 3.5%. Sales in 1959 were about 11% over 1958. Total construction increased 10%. The greater use of electrical equipment, it says, should account for the higher percentage. NECA estimates that the electrical content of construction, which was 4 to 5% 10 years ago, was about 11% in 1959; will be 12% in 1960. Electric heat, electronics and automation will increase the percentage.

A good rule of thumb reference point for electrical wiring potential is that used many times in the past. For every kilowatt of new generating capacity the local utility company plans to add, a certain amount of utilization equipment must be sold and wiring for it installed. Of the total capacity some 20% goes to domestic, 20% to commercial, 20% to industrial and the rest to large industry, interchange with other utilities and system losses.

Potential residential business can be estimated by taking a demand of 2 kw per residence. Each house represents about $450 in wiring, of which 60% goes to labor. Materials represent about $200. Then on top of this appliances, even without range and water heater, run to about $800; with them, at least $1,000.

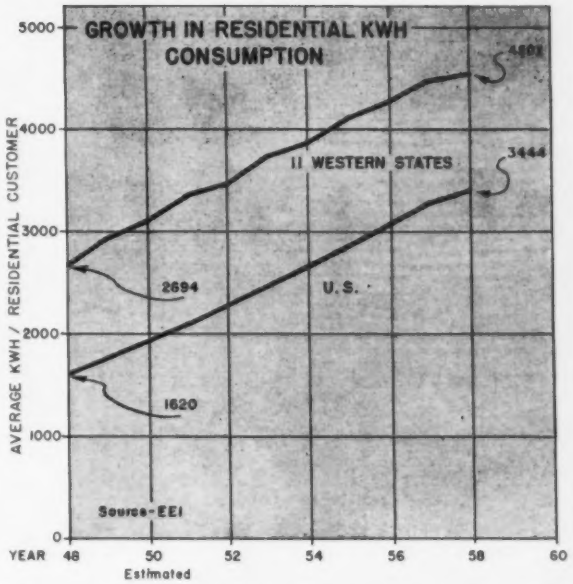
For each commercial kw about $1,000 of wiring is required, and so with small industrial power.

Thus, computing roughly the total market for the West from the 3 million kw to be added in 1960, some 600,000 kw will be for residential use, chiefly among new homes; 600,000 kw for commercial; and 600,000 kw for industrial.

Translated into wiring potential, this means at least $480 million in contracts for residential wiring, $600 million for commercial and $600 million for small industrial. This does not include the rewiring and remodeling where no great increase in load is added.

That this **must** be sold is what the money invested in that new generating capacity insists. So the utility company, in order to earn the interest on that investment, generates sales programs and selling effort to help contractors get wiring and dealers sell equipment that will use those kilowatts and pay for them.

To bring this potential business down to one's own town requires very little figuring once the utility figures are known. As an aid, the utilities have reported to us their intentions on other pages of this issue. A local follow-up will bring the base figures right down to your own trading area.



Residential Loadbuilding

Following a record year for appliance sales, 1960 prospects are for further gain—perhaps a boom, some forecasters think. Educated guesses on '60 predict an over-all gain nationally of from 3-5% over 1959, which was up about 15% over '58. Individual manufacturers put the '60 gain on specific appliances much higher. The president of one Western company recently forecast a 42½% increase on automatic dishwashers; 25% on disposers; 22% on built-in ranges and ovens.

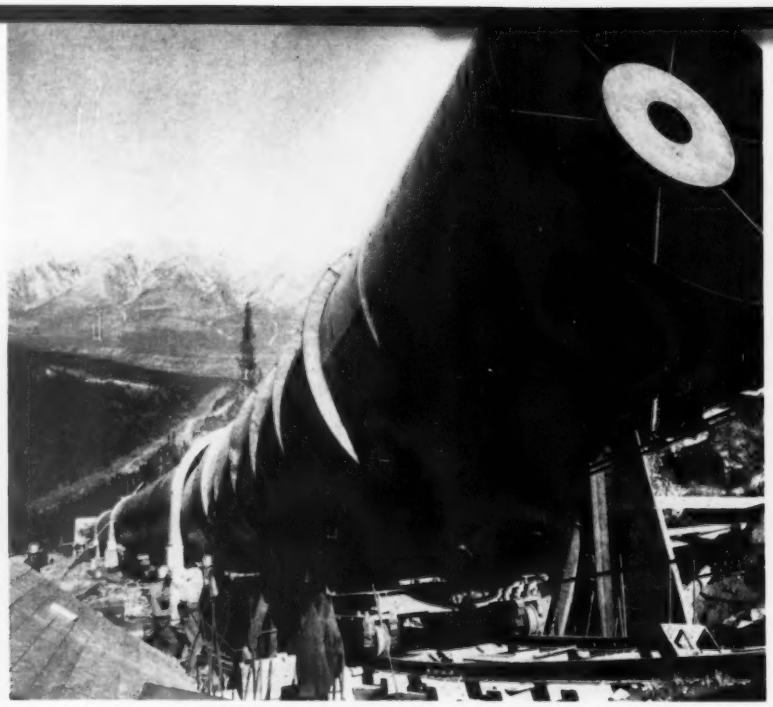
NEMA reports that major appliance manufacturers it represents hit the highest shipment level since the record year of 1950 and showed a 17% gain over the 1958 mark. It forecasts a further gain of 3% in 1960, with increases in every category except freezers, where it anticipates no change. Electric dishwashers will make the greatest strides percentagewise, it believes, followed by built-in ranges and disposers.

ALMA sees a 4% increase for home laundry appliance sales in '60. Sales in '59 added up to the third best year for the industry, only slightly lower than 1955, ALMA's research committee reports.

In the *Electrical Merchandising* annual summary, the Pacific region led the national average in every category except room air conditioners, dehumidifiers and water heaters (a tie). The Mountain region was ahead of the U. S. in all but air conditioners, dehumidifiers, vacuum cleaners and refrigerators. It also tied in water heaters.

As compared with other regions of the U. S., the Pacific states led in refrigerator sales, ranges (standard and built-in); food waste disposers, dishwashers. The Mountain states were ahead in television sales, tied for first in washer-dryer combinations.

Commenting on the outlook for the year in *Electrical Merchandising*, the McGraw-Hill Department of Economics pointed to an "after-tax" consumer income of $358.2 billion, up $24 billion; growing consumer optimism; a new peak in installment credit; an expected rise in government spending to $102.5 billion, up $4 billion; a 10% increase in business expenditure for new plants and equipment. Weak spots are an anticipated decline in housing and farm income.

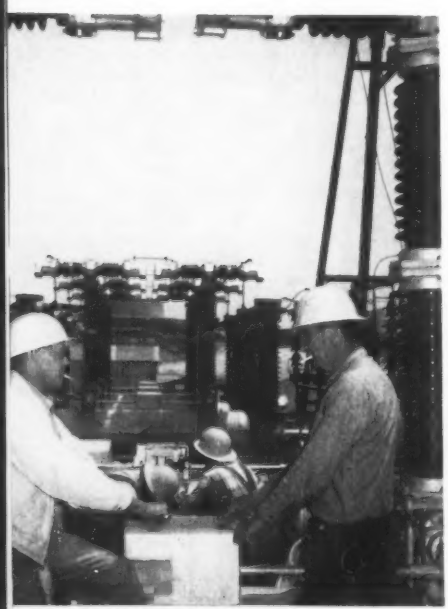


Calgary Power Ltd. presses forward with its Spray hydro project. Here an 8-ft section of T-1 steel penstock takes shape

As of June 1959, over 95% of farms in the 12 Western states were electrified

A picture story of 1959 construction and a detailed look at the future as . . .

Utility Executives



Ten million kva air blast breakers guard the power at Scattergood steam station

ARIZONA—Salt River's Budget Up from 11 to 25 Million. APS Peak Up 10%

Arizona Public Service

	REVIEW OF '59
CUSTOMERS	170,859
POWER SALES	2,649,795 mwh
SYSTEM PEAK	605.5 mw
CAPACITY	409 mw
CONSTRUCTION	$ 34,932,000

While plans are not yet firmed, there is a possibility that construction of unit No. 3 for the Ocotillo station will begin in the second half of 1960 with trial operations anticipated for March of 1962. The 110,000-kw unit will operate at steam conditions of 1,800 psig and 1,000/1,000 F reheat and employ five stages of extraction for feedwater heating.

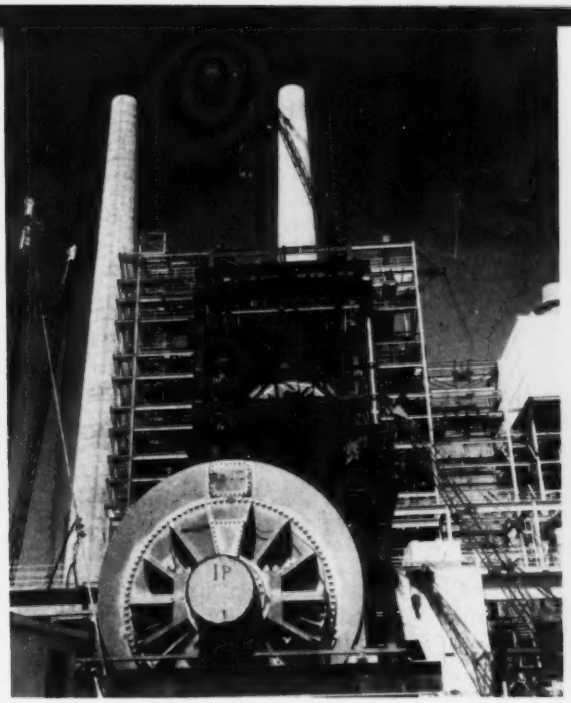
Discussions are still going forward with the Navaho Tribal Council relative to the construction of a 354-mw coal-fired steam electric station at Fruitland, N. M.

Salt River Project

	REVIEW OF '59
CUSTOMERS	80,000
POWER SALES	2,465,000 mwh
SYSTEM PEAK	476 mw
CAPACITY	428 mw
CONSTRUCTION	$ 11,110,000

Scheduled 1960 construction expenditures for the power system of the Salt River Project will amount to $25,000,000. About two-thirds of the total amount budgeted is for Agua Fria Unit No. 3. Construction was started on this 168,000-kw unit in the fall of 1959, with completion scheduled for spring of 1961. The addition of the new unit will bring the rating of the Agua Fria station up to 380,000 kw.

The microwave system between the Salt River Project and Arizona Public Service Co.'s dispatching offices will be modified in order to



Pacific Gas and Electric's Pittsburg steam plant addition will make it the largest west of the Mississippi, over 1,300,000 kw

Moving across rugged Western country, Idaho Power's lines will tie its Snake River plants to the Northwest Power Pool

Report 1960's Construction Projects

provide more complete data on tie line power flows and interchange between the two utilities. Microwave radio communications will be installed between the project's dispatching office in Tempe, Ariz., and Theodore Roosevelt Dam on the Salt River.

Street lighting installations are expected to continue at a high rate in the rapidly expanding residential areas of the project's service area, with 2,700 street lighting additions anticipated for 1960.

Other construction activities scheduled include the completion of the Ocotillo switchyard, installation of 112,500 kva of distribution substation capacity, construction of 57 miles of 115-kv and 69-kv transmission line, and addition of 150 miles of distribution line.—**T. M. Morong, chief engineer.**

Construction programs are listed under states on the following pages: Alaska, 75; Arizona, 58; California, 59; Colorado, 65; Hawaii, 74; Idaho, 67; Montana, 67; Nevada, 68; New Mexico, 68; Oregon, 69; Utah, 70; Washington, 70; Federal Agenies, 77; Canda, 75.

CALIFORNIA—Generation Additions in '60 Up 16%. Kwh Sales Up 12%

Alameda PU Dept.

	REVIEW OF '59
CUSTOMERS	15,891
POWER SALES	143,916 mwh
SYSTEM PEAK	32.5 mw
CAPACITY	0
CONSTRUCTION	$ 222,149

California Electric Power

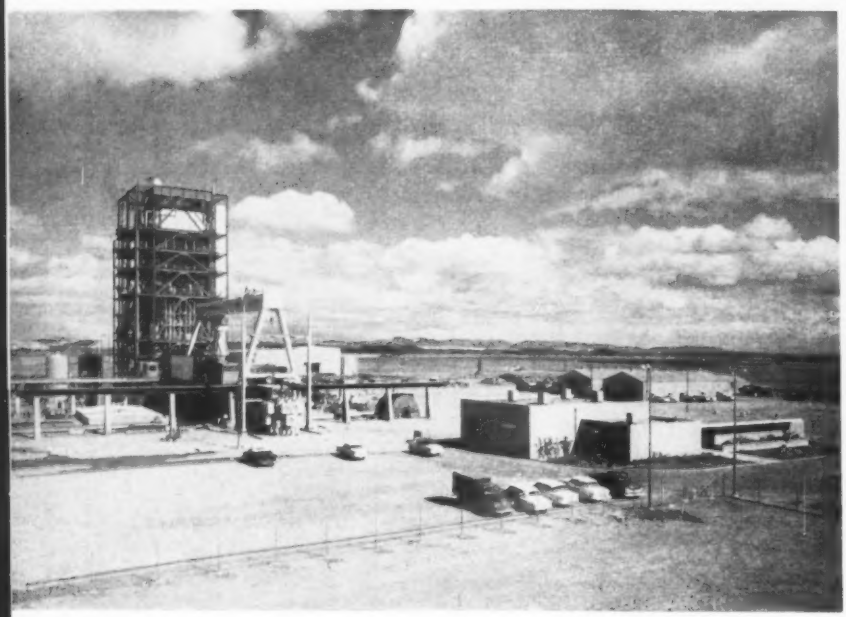
	REVIEW OF '59
CUSTOMERS	109,000
POWER SALES	1,676,600 mwh
SYSTEM PEAK	348.5 mw
CAPACITY	427 mw
CONSTRUCTION	$ 10,500,000

Construction work will be carried on at the cool water steam plant near Daggett, Calif., to permit bringing in the first 64,500-kw generating unit in the spring of 1961. Work at hydroelectric plants will include the replacement of 3,300 ft of wood-stave flowline.

Transmission expenditures will include the construction of line and terminal facilities for a 42.5-mile, 230-kv, 1,033-mcm, all-aluminum line to be operated initially at 115 kv. Another transmission line to be built will be a 7.5-mile section of 115-kv, 477-mcm, all-aluminum circuit together with terminal facilities, including a 12,500-kva substation, to permit utilization of a 28-mile section of existing line, initially operated at 34.5 kv.

Other transmission expenditures will include the replacement of four oil circuit breakers at an existing transmission substation and reinsulation and reconductoring on existing transmission lines.

Expenditures on primary distribution lines will include the construction of two sections, totaling 13 miles, of 477-mcm, all-aluminum circuit and the reconductoring of selected portions of existing lines using 795-mcm, all-aluminum conductor.



The Yuma-Axis power plant's first unit (80,000 kw) went on the line in 1959. The first unit was installed by California Electric Power Co., but will be operated by the Arizona Public Service Co.

Miscellaneous substation capacity increases will amount to 25,000 kva. —**W. T. Johnson, vice-president and assistant general manager.**

California-Pacific Utilities

	REVIEW OF '59
CUSTOMERS	35,770
POWER SALES	340,081 mwh
SYSTEM PEAK	91 mw
CAPACITY	25 mw
CONSTRUCTION	$ 2,438,340

During 1960 our engineering and operating people will undertake an extensive transmission line construction project which will provide an additional 10,000 kw of capacity for our Southern Utah Division. This project involves the construction of 92 miles of 138-kv transmission line that will interconnect our Southern Utah system with the systems of the Telluride Power Co. and the Utah Power & Light Co. Our company will build 42 miles of this transmission line from Cedar City to the north boundary of our service area at the Iron County line, and Telluride Power Co. will build the remaining 50 miles of line from this point through its service area to Sevier, Utah. Materials and substation equipment are on order and a survey is already in progress, with completion of the project scheduled for May 1, 1960.

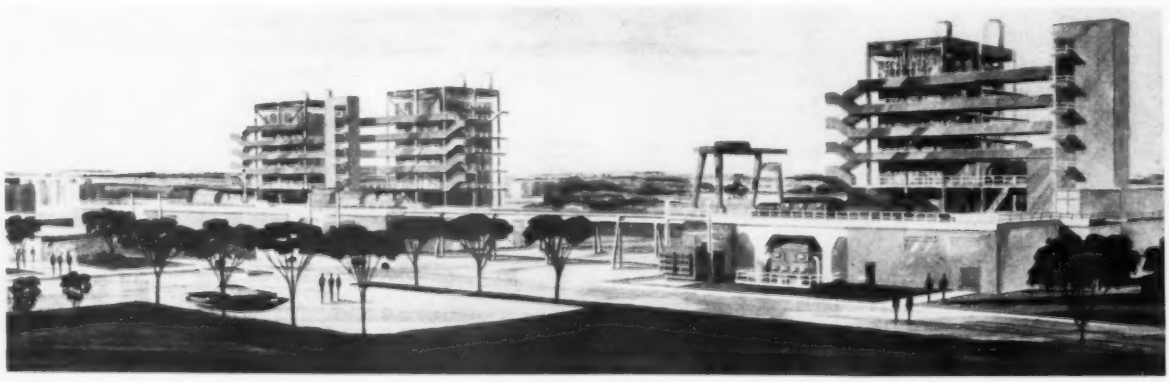
May I also mention that this new line will connect our Southern Utah system with the five-state power pool recently proposed by the investor-owned companies of Utah, Arizona, Wyoming, Colorado and New Mexico. It is expected that the integration of the utility transmission systems in the five-state Rocky Mountain area will receive the approval of the U. S. Bureau of Reclamation as it will provide for the eventual transmission of electricity from the Glen Canyon project and other generating facilities of the Bureau's Colorado River Storage Project. As mentioned above, the new line will provide for immediate delivery of 10,000 kw to our Southern Utah service area and the future construction of an additional 138-kv line already planned will provide delivery capacity of over 60,000 kw, which our studies indicate will care for growth through 1975.

The company's 1960 construction budget in excess of $3½ million provides for an expenditure of over $2.4 million for additional facilities on our electric properties. Forecasts indicate a continued increase in the use of electric service by all classes of customers, accordingly a large part of the budget will provide capacity needed for new loads. We therefore look forward to another year of substantial growth of the company's business during the coming year.—**E. K. Albert, president.**

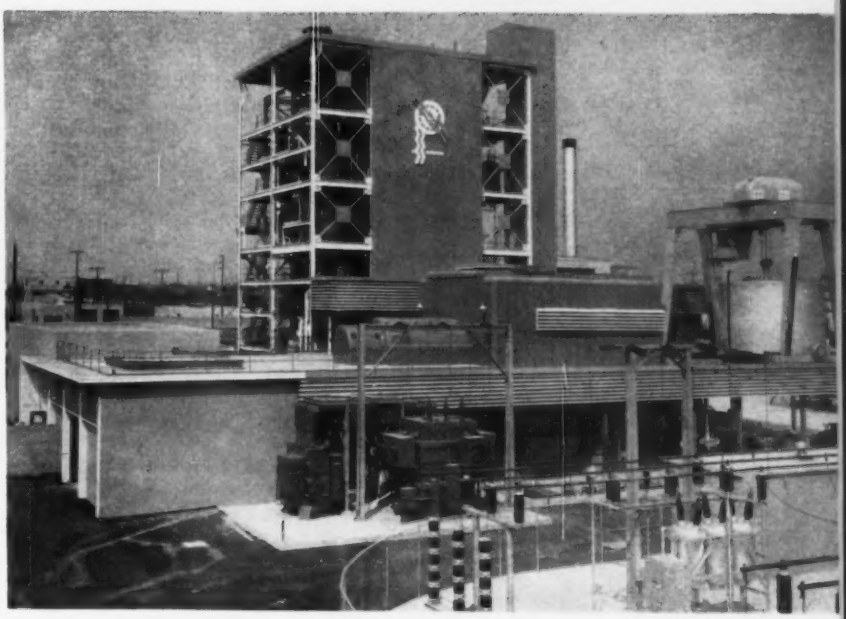
Burbank PS Dept.

	REVIEW OF '59
CUSTOMERS	37,500
POWER SALES	450,000 mwh
SYSTEM PEAK	87.5 mw
CAPACITY	119 mw
CONSTRUCTION	$ 4,200,000

During 1960, new construction for our system will be relatively light. We propose adding a second 69,000-v transmission line paralleling



Artist's conception of Salt River Project Agua Fria power station after the completion of unit No. 3 (168,000 kw) in the spring of 1961.



The addition of unit No. 1 (44,000 kw) at the city of Burbank's Olive Avenue plant increased the city's steam generating capability to 114,000 kw. The second unit is planned for operation in 1964

the first line to improve reliability of the new generating plant, and adding a second 69-kv to 34-kv transformer at the terminus of this line, together with associated switching equipment. We will add a second transformer bank of 10,000 kva capacity to the new Flower Street distributing station, additional 4.3-kv feeders out of this station, and 10,000 kva of transformers on our 34-kv system, to serve large industrial customers. We also will install approximately 6,000 kvar of capacitors, already purchased, as an initial step in applying capacitors to the distribution system.—**A. E. Capon, assistant general manager and chief engineer.**

Glendale PS Dept.

	REVIEW OF '59
CUSTOMERS	52,500
POWER SALES	286,000 mwh
SYSTEM PEAK	69 mw
CAPACITY	104 mw
CONSTRUCTION	$ 5,110,000

The current 1959-60 fiscal year's budget for capital expenditures is $2,133,000 of which $900,000 are for the completion of the No. 4 unit of the steam-electric power plant.

Other projects planned for the remainder of the fiscal year include the construction of underground transmission duct lines and the installation of cable to relieve the congested condition existing in the overhead transmission system in the vicinity of the power plant.

The routine budget program of replacing older pole lines which have passed their economic life will be continued. Addition of the new distribution substation transformer capacity will make necessary the rearrangement of older substation distribution areas in order to serve new load from the released capacity.—**L. W. Grayson, general manager and chief engineer.**

Imperial Irrigation District

	REVIEW OF '59
CUSTOMERS	30,411
POWER SALES	575,000 mwh
SYSTEM PEAK	144 mw
CAPACITY	173 mw
CONSTRUCTION	$ 1,927,400

Because of weather conditions during the year of 1959, the load on the district's system for this year will be within 2% of the load for the calendar year of 1958.

The year of 1959 saw the start of pool operation of the Lower Colorado River systems of Arizona Public Service Co., California Electric Power Co. and the Imperial Irrigation District. The 75,000-kw Axis steam plant of the California Electric Power Co. at Yuma was placed in service as part of the pool generating resources.

Plant additions for the year of 1959 amounted to $1,800,000 and a like amount is budgeted for the year of 1960.

For the year of 1960, a new substation of 20,000 kva capacity between the 92- and 33-kv system, together with seven miles of 92-kv transmission line, is planned for service in the Salton Sea area.

Preliminary work on 50 miles of 161-kv transmission line between Niland and Coachella has been started with construction scheduled for 1961.

Los Angeles Dept. of W&P

	REVIEW OF '59
CUSTOMERS	902,000
POWER SALES	6,540,000 mwh
SYSTEM PEAK	1,530 mw
CAPACITY	2,003 mw
CONSTRUCTION	$ 54,900,000

The second 156,250-kw turbine generator at Scattergood steam plant was synchronized to the system in July 1959. Installation of the two initial units will be completed in 1960. Ultimate capacity of this plant will consist of six units with at least 1,200,000 kw capacity.

AEC has requested invitations for a 50,000-kw net electrical advanced boiling water reactor power plant of a compact design of the type the department has been interested in for some time. The department and the city of Pasadena will offer a proposal to construct and operate this facility and, if accepted, it will be progressed during the year.

The department has filed an application for license with FPC for the Bridge Canyon Power Project and will file an application for a construction permit within the current month. This project has also been filed on by the Arizona Power Authority and a bill has been introduced in Congress for the construction of a similar project. It is hoped that the authority to construct this project will be resolved during the current year.

The 1960 construction program totals $42,440,000. About a third of this program is planned for continuation of construction of the Haynes steam plant. Initial installation will consist of two 230,000-kw units, with a planned ultimate capacity of 1,400,000 kw. Several major awards of equipment have already been made and contracts will be awarded for the remaining major items in 1960. The two units are scheduled for operation in the late summers of 1962 and 1963 respectively.

The second circuit of the 12.4 mile 138-kv transmission line from Scattergood steam plant to Receiving Station D was energized in July 1959.

The historic Geysers plant. On the line in 1960, it will be the first geothermal plant in the U. S. A.

This line consists of 4.8 line miles of tower line and 7.6 miles of underground line. Receiving Station N with an initial capacity of 120,000 kva was energized in May 1959. Two new distributing stations are scheduled to be completed in 1960, and this capacity added to power bank changes at existing stations will provide a total increase of 63,000 kva at distributing stations. New distribution lines to be built in 1960 include 80 miles of pole line and 20 circuit miles of underground cable. The anticipated system peak for 1960 should approximate 1,655,000 kw.—**Ivan L. Bateman, chief electrical engineer and assistant manager.**

Modesto Irrigation District

	REVIEW OF '59
CUSTOMERS	28,650
POWER SALES	305,270 mwh
SYSTEM PEAK	64 mw
CAPACITY	11.5 mw
CONSTRUCTION	$ 992,000

The work at Station J was begun in 1959 and will continue into 1960. Four 115-kv oil circuit breaker towers are being erected, two for the terminus of new lines 7 and 8 and two for existing lines 3 and 4. These lines supply purchased power from the city of San Francisco Hetch Hetchy power system. In addition considerable rearrangement and additions to the 115-kv busing beyond the terminal towers is being done.

Work has been under way for some time and will continue into 1960 for the construction of a 10,000 kva 69 to 12-kv distribution substation. The station will at present have four 12-kv feeders and will incorporate in its design the latest in supervisory control and alarm equipment.

Money has been budgeted for the acquisition of a 115-kv transmission line right-of-way and transmission substation site. This line and site will ultimately be a terminus point on the eastern portion of our district for the new Don Pedro development transmission lines. — **C. E. Plummer, chief engineer.**

Pacific Gas and Electric

	REVIEW OF '59
CUSTOMERS	1,910,000
POWER SALES	21,400,000 mwh
SYSTEM PEAK	4,565 mw
CAPACITY	5,219 mw
CONSTRUCTION	$109,000,000

The maximum demand on the company's system occurred on Aug. 7, 1959, when the system peak reached 4,564,900 kw, more than 13% higher than the peak for 1958.

Gross capital outlay for electric plant in 1959 amounted to approximately $109 million, compared to the 1958 expenditure of $148 million. It is estimated that this figure for 1960 will be $102 million. Gross capital expenditures for electric, gas and other plant for the postwar period 1946-59 approached $2.2 billion in the year 1959.

No new generating capacity was added to the company's system in 1959. The total generating capacity at the end of 1959 was 5,219,000 kw. By the summer of 1960 an additional 337,500 kw of capacity will be installed, which will meet growth in demand through this year.

Construction of the Kings River hydro plant was started in September 1959, with operation scheduled for mid-1962. This plant, to be located at the lower end of the company's Kings River chain of reservoirs and plants, will have a capacity of 42 mw. It will complete the company's Kings River development, which adds a total of 261,500 kw of generating capacity.

Conventional thermal plant construction continued in 1959 on Units 5 and 6 at Pittsburg power plant, on Suisun Bay, west of Pittsburg. Construction of Unit 5 was started in December 1957 with operation scheduled by the summer of 1960. Construction of Unit 6 started in March 1959 with operation slated for the summer of 1961. Each of these units will add 325 mw to system capacity and the two will increase plant capacity to 1,310 mw, or double its present size. The cost of this additional 650 mw is estimated at $80 million, exclusive of transmission.

In 1958 PG and E announced plans to construct a nuclear unit at the Humboldt Bay power plant site near Eureka, to be known as Unit 3. This plant, a significant development in the peacetime application of nuclear energy, has been made possible by advances in the design and technology of the boiling water reactor, based on knowledge gained in the successful operation of the Vallecitos atomic plant, and favorable circumstances at the proposed plant location. These two factors will combine to achieve competitive power with the second uranium fuel core. It is expected that this goal will be approached with the first core. The unit will have an expected output of 60 mw and may reach an output of 70 mw. Service is scheduled for the fall of 1962 at an estimated cost of $20 million, excluding transmission.

The company is constructing a geothermal generating plant at The Geysers in Sonoma County. This plant, the first of its type in this country, will take delivery of steam from underground wells owned and developed by the Magma Power Co. and the Thermal Power Co. The natural steam will drive a 12,500-kw turbogenerator unit. Construction was started in July of last year with completion scheduled by the summer of 1960. The plant is estimated to cost $1¾ million, excluding transmission.

In early 1959 the company submitted an application to the Federal Power Commission to amend its present license to permit replacement of generating facilities of the Stanislaus hydro plant located on the Stanislaus River, Tuolumne County. This plant was originally placed in operation in 1908 and comprises four units with a total capacity of 40 mw. The company proposes to replace these units with a single unit of approximately 80 mw capacity. The installation will include a steel penstock about 4,650 ft in length from the existing forebay. Present plans anticipate that the plant will be operative late in 1962. This reconstruction is estimated to cost $11 million.

During 1959 the company added 584 mva of transmission and distribution substation transformer capacity to its system. During the current year an estimated 991.5 mva

will be placed in operation. This total for 1960 includes 396.5 mva of step-up capacity at Pittsburg and The Geysers generating plants.

The company added 241 line miles of transmission (60 through 220 kv) and 1,287 line miles of distribution lines to its system during 1959. For the current year, 204 and 1,220 line miles, respectively, are planned for construction.—**John F. Bonner, vice-president in charge of engineering.**

Pasadena Municipal L&P Dept.

	REVIEW OF '59
CUSTOMERS	47,649
POWER SALES	384,001 mwh
SYSTEM PEAK	112 mw
CAPACITY	155 mw
CONSTRUCTION	$ 2,835,000

During the fiscal year 1958-59, energy sold in Pasadena exceeded the previous year by 4.97%. Total revenues increased by 7.36%. Additions to capital amounted to $2,834,329.96. Distribution transformers in service increased from 142,931 kva to 156,665 kva or 9.61%. Number of meters increased from 48,471 to 49,499 or 2.12%.

Major Construction

The department's major construction projects contemplated for the next few years are listed below and tentative schedules indicated:

1. Installation third unit at Chester 59/60
2. Installation third unit at Hastings 59/60
3. Installation second unit at Fair Oaks 59/60
4. Installation third 34,000-v line to Santa Anita. 59/60
5. Increase capacity of tie line to Los Angeles 60/61
6. New substation—southwesterly section of the city 60/61
7. Conversion of remaining 2,400-v distribution circuits to 4,160 v 59/60/61
8. New generating capacity.62/63

—**T. M. Goodrich, general manager and chief engineer.**

Riverside PU Dept.

	REVIEW OF '59
CUSTOMERS	31,500
POWER SALES	195,000 mwh
SYSTEM PEAK	48 mw
CAPACITY	0
CONSTRUCTION	$ 900,000

Sacramento MUD

	REVIEW OF '59
CUSTOMERS	152,900
POWER SALES	1,261,038 mwh
SYSTEM PEAK	283 mw
CAPACITY	0
CONSTRUCTION	$ 28,000,000

The pattern of construction expenditures for 1960 will be similar to that in 1959, the usual accelerated pace.

A total of $38 million is budgeted for construction in 1960 which is a 35% increase over 1959. Of this amount $24 million are slated for continued construction on the district's Upper American River hydroelectric project. Major features of this project now under construction are the 420-ft-high Union Valley Dam 10 miles north of Riverton, El Dorado County; the four-mile-long Jaybird Tunnel; and the 134,000-kw Jaybird power plant on Big Silver Creek north of Pollock Pines. The first of the two Jaybird units, each rated 67,000 kw, is expected to be placed in service in late October of this year.

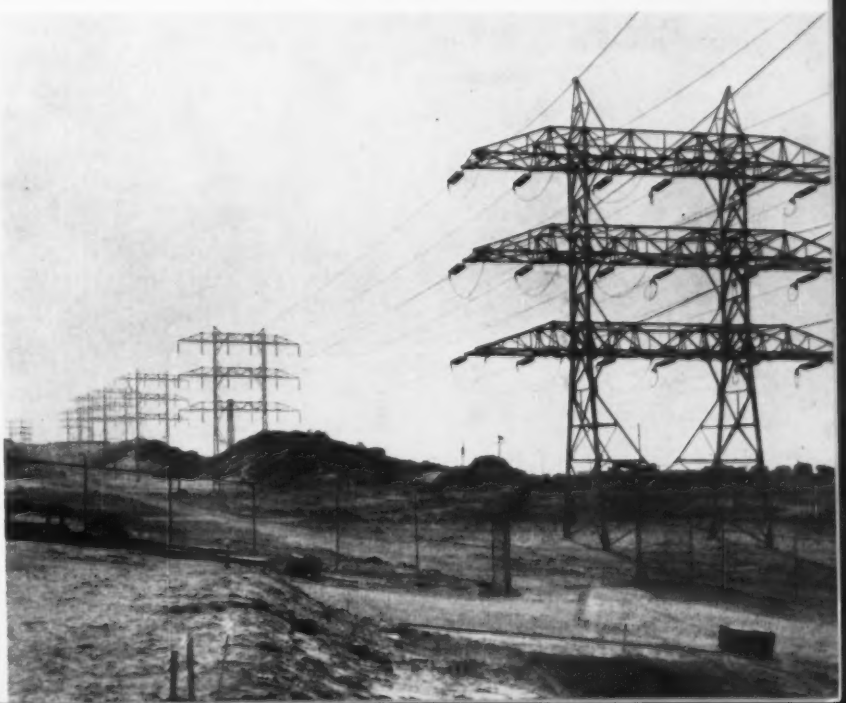
The final link of 30 miles of 230-kv double-circuit, steel-tower transmission line is also presently under construction and planned for completion in time to bring the Jaybird power to the district's recently completed Hedge receiving station southeast of Sacramento.

Expansion and sectionalizing of the district's North City substation 115-kv bus with the addition of six oil circuit breakers is scheduled to provide takeoffs for a double circuit, high pressure, oil filled pipe-type cable system. This pipe-type cable system is being constructed to the district's new 115/12-kv Station B. Construction on Station B is under way and planned for completion in late 1960. It is located on the periphery of the downtown underground distribution area and is to have an ultimate capacity to supply three separate 30-mva networks, each via six 12-kv feeders.

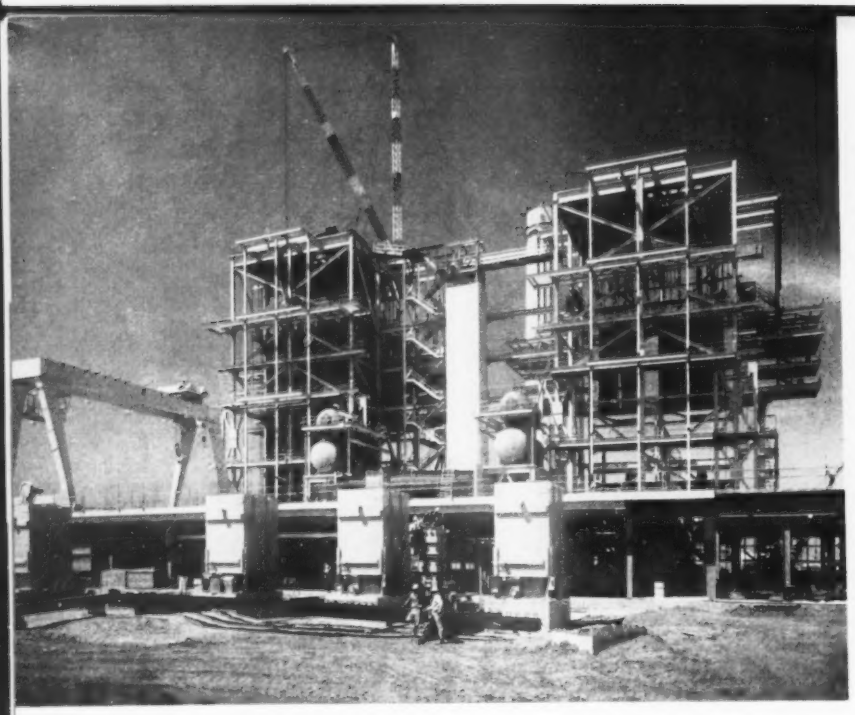
Continued expansion of the 12-kv fed secondary network in the downtown area is scheduled to supply the ever-increasing load occasioned by construction of general commercial establishments, large State of California office buildings, and the Sacramento redevelopment area. Construction was recently started on the first project in this area—a federal office building. It is anticipated that as many as 29 new network transformers totaling 19,500 kva may be required during the year.

Overhead system expansion in the form of subtransmission lines, distribution substations and lines continue to require the major portion of capital expenditures. Approximately 31 miles of 69-kv subtransmission are planned for completion before year-end along with five new unit substations totaling 25,000 kva. Large customer banks scheduled for installation at various locations during the year will total an additional 12,750 kva. Along with the usual distribution line construction, an additional 90 miles of 4-kv line is planned to be converted to 12 kv.

VAR supply to the distribution system will continue to be handled with the addition of fixed and



Low level tower construction adjacent to Los Angeles airport carries six circuits from city of Los Angeles Scattergood steam plant



Southern California Edison's Mandalay steam station now operating two units with a combined capacity of 430,000 kw. Mandalay is the location of Edison's sea water distillation experiment

switched capacitor banks at the distribution line voltages. Approximately 29 mva of "switched" and 4 mva of "fixed" banks will be installed during the year. The switched capacitor banks will be operated automatically by either VAR or thermal controls or by time clock.

The district anticipates the addition of about 9,000 customers during the coming year, which additions will bring the total customers served by SMUD to over 161,000 at the end of 1960. The estimated total sales to these customers will amount to 1,420,000,000 kwh for an average annual usage of about 8,800 kwh per customer.—**Charles R. Day, supervising electrical engineer.**

Southern California Edison

	REVIEW OF '59
CUSTOMERS	1,567,000
POWER SALES	15,650,000 mwh
SYSTEM PEAK	3,181 mw
CAPACITY	3,834 mw
CONSTRUCTION	$115,000,000

Approximately $115,000,000 were expended during the year 1959 for plant additions to generation, substation, transmission line, distribution line, and other system betterments. The budgeted amount for 1960 is approximately $120,000,000 for like system additions and betterments.

During the past year, 825 line miles of distribution circuits were placed in service and 195 miles of transmission circuits were constructed. Fourteen new distribution substations were placed in service with an aggregate capacity of 147,300 kva. Transformer capacity of 152,350 kva was added to existing distribution substations and 318,000 kva were added to existing transmission substations. Approximately 65,000 net new meters were connected to the system.

Two new generating units with a net effective operating capacity of 430,000 kw were placed in service during 1959. They are Units 1 and 2 at Mandalay steam station. The plant is designed for two or more additional large units. Unit No. 1 was placed in commercial operation on May 15, 1959, and Unit No. 2 on Aug. 27, 1959. Cost of the two-unit installation, exclusive of transmission line and appurtenant facilities but inclusive of the cost of certain joint facilities for use with future additional units, was approximately $52,850,000.

Currently under construction are: 150,000 kw maximum of new hydrogenerating capacity, consisting of two units at the Mammoth Pool project; and 440,000 kw of new steam generating capacity consisting of two additional units at Huntington Beach steam station.

Construction work on the Mammoth Pool project was initiated in January 1958. It is a hydroelectric power project including a dam, reservoir, appurtenant water conduit and penstock, power house, transmission lines and other necessary or useful structures and facilities.

Presently estimated cost of the project, exclusive of transmission lines, is approximately $49,200,000. It is scheduled for commercial operation in May 1960.

The present net effective operating capacity of the two existing units at Huntington Beach steam station is 435,000 kw. Construction work on Units 3 and 4 was started in May 1959. Each of the new units is expected to have a net effective operating capacity of 220,000 kw and, when they are placed in commercial operation, the station is expected to have a total net effective operating capacity of 875,000 kw.

Presently estimated cost of the two new units, excluding cost of land and land rights and excluding presently estimated cost of new transmission lines and appurtenant facilities, is $56,600,000. Unit No. 3 is scheduled for commercial operation in December 1960, and Unit No. 4 in July 1961.

Also presently under construction is California's first general purpose sea water distillation plant at Mandalay steam station. It will be an experimental pilot distillation plant with a capacity of about 100,000 gal a day. It is not expected to produce water at a cost competitive to present sources, but its primary purpose will be for research and development and possibly to supply a portion of the feed water requirements of the Mandalay station.

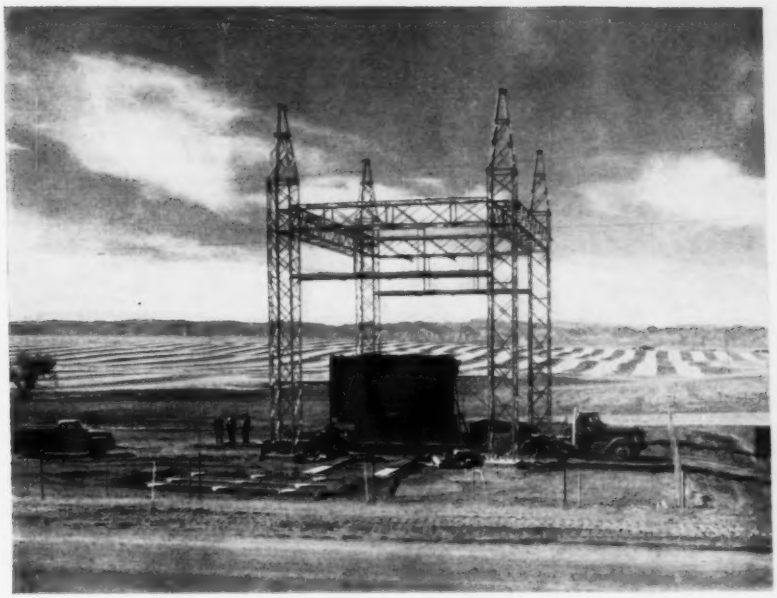
Planned for construction in 1960 are 12 new distribution substations. These new stations, together with additional transformer capacity to be added during 1960 to existing transmission and distribution substations, will require approximately 680,000 kva of new transformer capacity.

Plans are in progress to construct 990 line miles of transmission and distribution circuits in 1960 and to connect approximately 63,500 new meters.

San Diego G&E

	REVIEW OF '59
CUSTOMERS	316,400
POWER SALES	2,345,300 mwh
SYSTEM PEAK	602.5 mw
CAPACITY	667 mw
CONSTRUCTION	$ 25,578,000

Construction expenditures in 1960 will total approximately $21,090,000. The first unit at the new South Bay power plant will add 142,000 kw to system capability when it becomes operational on July 1, 1960. Expenditures on the unit this year are expected to be $5,000,000, bringing the total cost of the station to $22,500,000. Construction of a second 142,000-kw unit at this station will



Colorado Central prepares for residential growth in a rural area through the addition of the Greenwood substation southeast of Littleton

Steel raising on PS of Colorado's 115/13-kw Union sub at Midway terminal

COLORADO—Expenditures Up 18%. Transmission Line Miles Planned Double!

Colorado Central Power

	REVIEW OF '59
CUSTOMERS	36,160
POWER SALES	316,220 mwh
SYSTEM PEAK	57 mw
CAPACITY	0
CONSTRUCTION	$ 2,075,000

The Colorado Central Power Co. expects to spend $2,750,000 for construction during 1960. Approximately $1,250,000 will be spent for connecting new customers during the year. It is anticipated that the company will spend approximately $1,000,000 for major system improvement during 1960, including a new 115/13.8-kv substation of 15 mw capacity to be installed during 1960 in our Jefferson County District, as well as a number of new 13-kv feeders to be installed in both Arapahoe and Jefferson County Districts.

Approximately $500,000 will be spent for buildings, transportation and miscellaneous equipment during 1960, including a new engineering building in the Arapahoe District.

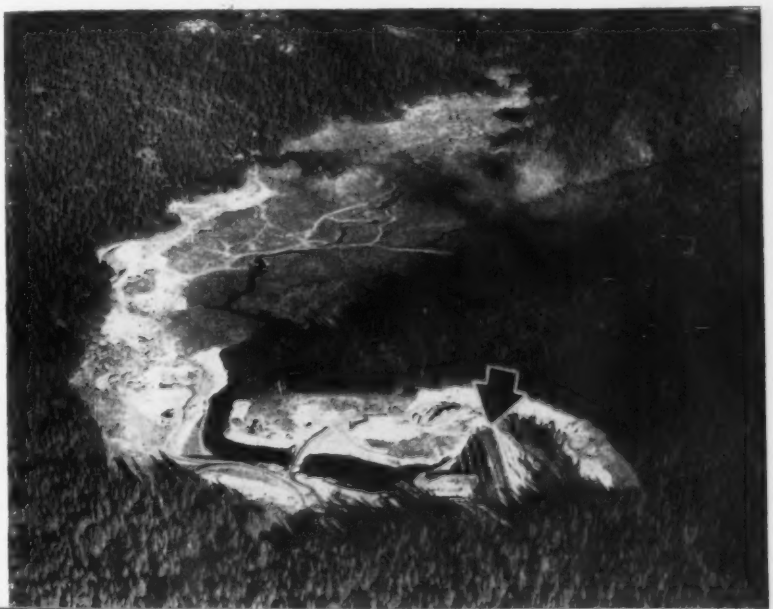
be under way by midyear and is scheduled to be in service by July 1, 1962. Of the $18,000,000 total cost, $1,000,000 have been budgeted for 1960. Other electric production projects total $145,000.

Investment in transmission facilities will be about $3,336,000 this year, including the cost of 37 miles of new line and 150,000 kva of transmission substation transformer capacity. A record $4,000,000 has been allocated for new customer extensions. Other distribution expenditures are expected to amount to $6,645,000, including $2,400,000 for transformer and meter purchases. About 254 miles of distribution line and 106,000 kva of distribution substation transformer capacity will be added in 1960.

Three new operating headquarters will be completed this year at a cost of $1,215,000. A fourth operating headquarters project will be delayed until 1961. Each headquarters will be in the San Diego area, equipped and staffed for both electric and gas operations.

Turlock Irrigation District

	REVIEW OF '59
CUSTOMERS	20,300
POWER SALES	179,300 mwh
SYSTEM PEAK	38 mw
CAPACITY	28 mw
CONSTRUCTION	$ 680,000



Sacramento MUD's Ice House Dam, first unit of $170 million hydro development on American River. The American River development will be SMUD's first generation

Aerial view shows these features of Idaho Power's Brownlee Dam. 1. 360,000-kw power house. 2. Intake structure that feeds water from the reservoir to power house. 3. Rock-filled embankment — the world's second highest such structure. 4. Concrete spillway —14 stories tall. 5. Experimental downstream migrant fish facility. 6. Park and boating facilities developed by Idaho Power

Looking out of Idaho Power Co.'s Oxbow power tunnel into open area that will house two 130-ft-diameter concrete surge tanks. Beyond the surge tanks, two steel-lined penstock tunnels lead to the power house

and operations headquarters building in the Arapahoe County District near Littleton, Colo.

Several of our cities have requested modernization of their street lighting systems and the company expects to spend approximately $250,000 on this program during 1960.

New transistorized supervisory equipment is to be installed between our dispatcher's headquarters and the company's 115/13.8-kv substations during 1960. Microwave and company owned and leased wire will be used to provide necessary tie circuits for this equipment. — **Lee R. Jones, executive vice-president.**

Public Service of Colorado

	REVIEW OF '59
CUSTOMERS	313,500
POWER SALES	2,876,000 mwh
SYSTEM PEAK	644 mw
CAPACITY	834 mw
CONSTRUCTION	$ 22,490,000

Public Service Co. of Colorado invested $22,490,000 in new and improved electric facilities during 1959. Included in last year's projects were completion of the 110-mw Cherokee No. 2 generating unit and 43 miles of transmission line including double circuiting of another section in the Denver 115-kv belt line. The system's second 115-kv unit substation was part of the 135 mva of new transmission transformer capacity. Population growth in recent years, reflected in the 10,000 new 1959 customers, required the addition of two new service centers in the Denver metropolitan area. Peak load on the system exceeded 644 mw in December, while 1959 kwh sales to customers approached the three-billion mark. This compares with 2.67 billion in 1958.

1960 Plans

Nearly $26 million will be spent in 1960 to build the electric facilities required by our customers. An indication of this customer growth may be gained from the 107 mva of distribution substation capacity to be added this year. The No. 2 unit at the Cameo station will bring the company's generating capability west of the Continental Divide to over 100 mw.— **L. R. Patterson, vice-president, electric operations.**

Southern Colorado Power

	REVIEW OF '59
CUSTOMERS	48,300
POWER SALES	385,000 mwh
SYSTEM PEAK	72 mw
CAPACITY	90 mw
CONSTRUCTION	$ 1,400,000

Perhaps our most important work during the year 1960 will be the installation on the east outskirts of the city of Pueblo, a new 115/69-kv substation with transformation in the 41.6 mw capability range. This station will form a part of our plan to supply the Colorado Fuel & Iron Corp. steel mill with all future expansion requirements. Engineering and contractual work are now being started, and perhaps some construction will be accomplished in 1960.

A new 69-kv transmission will be built from La Junta to Las Animas, with further extension to Lamar being contemplated.

Some work will be done in connection with a new generating unit in 1960, at least with respect to engineering.—**W. C. Porter Jr., vice-president in charge of operations.**

IDAHO—Spending Goes From $20 to $24.4 Million. Peak Up 11%

Idaho Power

	REVIEW OF '59
CUSTOMERS	134,500
POWER SALES	3,400,000 mwh
SYSTEM PEAK	580 mw
CAPACITY	828 mw
CONSTRUCTION	$ 20,000,000

Idaho Power Co. will invest some $23,500,000 in new service facilities in 1960, with Oxbow Dam being moved steadily toward completion as the second unit in the utility's three-dam development on the Snake River.

Biggest single expenditure will be for Oxbow Dam, which is scheduled to add its 200,000-kw output to the company's steadily growing generating capacity in 1961. With 360,000-kw Brownlee Dam in full initial production since January 1959, completion of Oxbow will leave only Idaho Power's Hells Canyon Dam still to be built in its new development.

Sizable amounts of the 1960 investment also are earmarked for two major transmission line projects. The company expects to complete its portion of a 108-mile line extending northward from Oxbow Dam to Lewiston to interconnect Idaho Power's development with the Pacific Power & Light Co. and Washington Water Power Co. systems. Idaho Power is building the first 66 miles of the 230,000-v carrier, with Washington Water Power building the remaining 42 miles.

The second major transmission project is a 190-mile line between Boise and American Falls. Fifth 230,000-v line to be built by Idaho Power since 1955, it will give the utility another dependable tie between the east and west ends of its interconnected system.

Idaho Power extended service to 315 new pumps during 1959, boosting the total supplied by the company to more than 5,300 pumps watering some 500,000 acres.

1960's achievements at Oxbow will include completion of the power tunnels, the penstocks and the Idaho spillway. Workmen also are expected to start placing concrete for the 295-ft-long power house and to start installing the turbines for the project's four initial generating units.—**T. E. Roach, president.**

MONTANA—Kwh Sales, System Peak Drop in '59. Montana Power Buys Coal Reserves, Looks to Steam Expansion

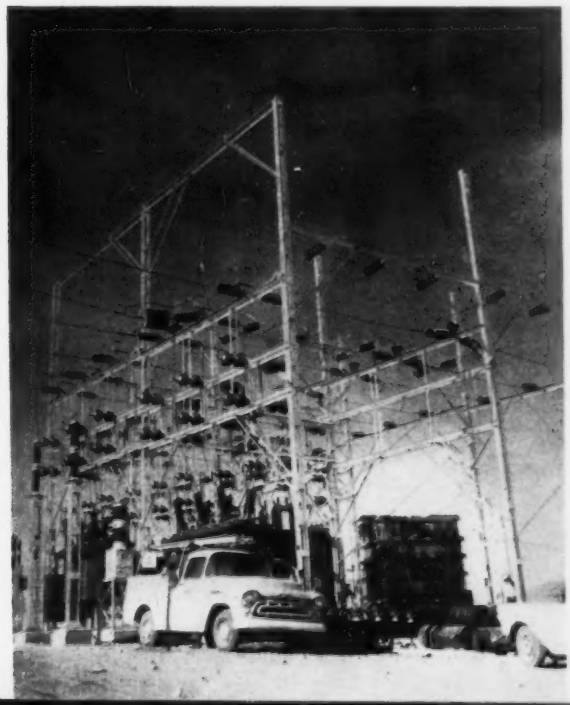
Montana Power

	REVIEW OF '59
CUSTOMERS	148,533
POWER SALES	2,958,000 mwh
SYSTEM PEAK	490 mw
CAPACITY	671 mw
CONSTRUCTION	$ 6,620,000

Normal construction to meet load growth, which has returned to the rate of increase experienced prior to the 1958 recession, will highlight 1960 activity for the Montana Power Co. The utility has scheduled expenditures totaling $4,185,000 for electric system construction.

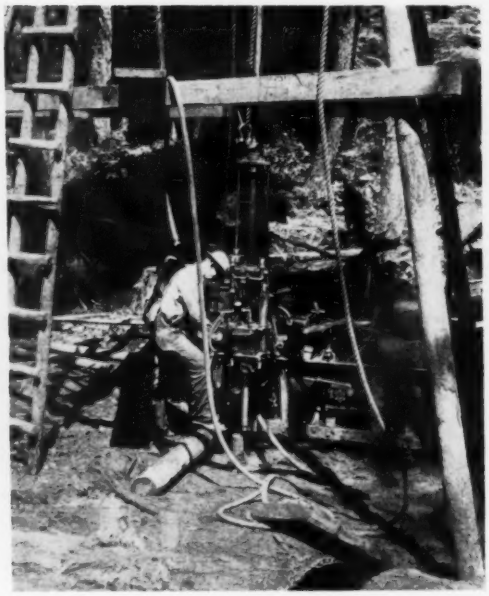
One major project will be repair of the company's Hebgen Dam, an important storage and regulation development that was damaged by the earthquake which struck the Madison valley last August. The dam came through the earthquake with relatively minor damage and is still operating safely, but the reservoir is being drawn down this winter to permit examination and repair of the earth-fill structure and its concrete spillway so the lake can be re-

Sierra Pacific Power Co.'s new Mt. Rose substation takes shape



At the right construction crewmen use a giant crane to raise a 75-ft. tower, which will form part of the 230-kv line from Nephi to Sigurd. This is the first leg of a $15 million transmission grid connecting Utah with the Arizona Public Service Co. system

Breaking ground for Southern Nevada Power Co.'s third unit at Clark steam station are, left to right, Dwight Hoopes, chief engineer, D. D. Smalley, consultant, C. S. Wengert, vice-president, E. F. Johnson, vice-president, at the controls President Reid Gardner, and Don Provost, vice-president of Stearns-Roger Mfg. Co.—the firm that will be responsible for construction



Workmen drill test holes at the site of the new Carmen-Smith hydroelectric project of the Eugene Water & Electric Board on the Upper McKenzie River. Completion of the 90,000 kw project slated for 1962

filled starting with the 1960 runoff.

Also scheduled for early in 1960 is completion of the utility's microwave communications system. Final work on the east leg to Billings will give the company microwave communications throughout practically all of its system.

During the year, the company purchased substantial coal reserves at Colstrip, Mont., together with electric loading and stripping shovels and associated accessory equipment. Between 50 and 60 million tons of subbituminous coal are located on or near the surface of the ground in the Colstrip area, giving the company almost unlimited low-cost fuel for future steam-electric generating plants. Station plans not yet firmed.

NEVEDA—Spending Soars From $5.5 to $12.8 Million. Power Sales Up 13%

Sierra Pacific Power

	REVIEW OF '59
CUSTOMERS	42,500
POWER SALES	586,684 mwh
SYSTEM PEAK	110 mw
CAPACITY	9 mw
CONSTRUCTION	$ 3,300,000

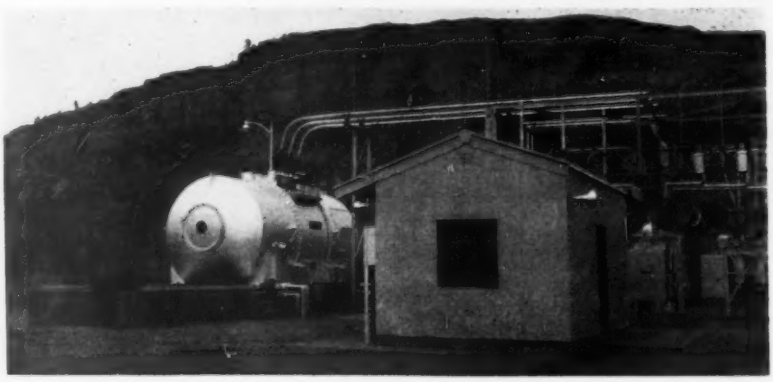
The service area of this company in western Nevada and the Lake Tahoe-Sierra Nevada Mountain region of eastern California is expected to show substantial load growth in 1960, and for several years to come.

The average use per residential customer in the company's service area is now running over 5,000 kwh per year. The Winter Olympics of 1960 at Squaw Valley has accelerated development of the Sierra winter sports regions.

A 1960 construction program of about $4,000,000 is anticipated to increase transmission, subtransmission and distribution facilities.

The completion of the Mount Rose switching station south of Reno

Montana Power Co.'s new synchronous condenser in the Billings area will add from 50 to 60,000 kvar to the system increasing transmission capacity, improving voltage



NEW MEXICO—Kwh Sales Up 29%. Customers Increase 7%

Public Service of New Mexico

	REVIEW OF '59
CUSTOMERS	97,157
POWER SALES	802,139 mwh
SYSTEM PEAK	180 mw
CAPACITY	208 mw
CONSTRUCTION	$ 10,500,000

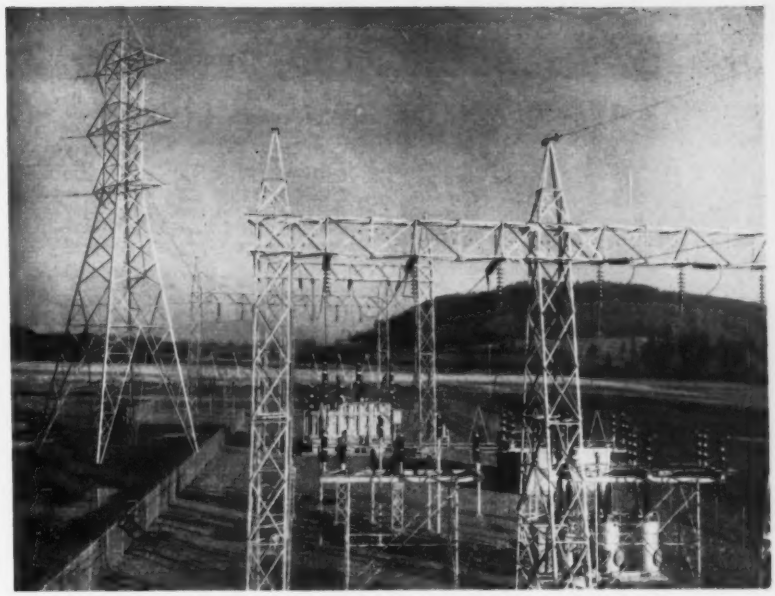
in early 1960 will improve flexibility and capacity of supply to the 23-kv loops serving the Reno-Sparks metropolitan area and of the 60-kv feeders southeast to Carson City, Minden and Yerington.

Additional substation capacity of 12,500 kva will be added to the Reno-Sparks area by the addition of four 2,500 kva/3,125 forced-air units. A 60/23-kv transformation of 3,750 kva capacity will be established at Yerington to provide for expansion in the Yerington-Smith Valley areas, mainly for irrigation pumping.

South Tahoe substation will be increased by 10,000 kva to keep step with the building boom in that area. **—M. H. Atcheson, chief engineer.**

Southern Nevada Power

	REVIEW OF '59
CUSTOMERS	35,250
POWER SALES	709,604 mwh
SYSTEM PEAK	170 mw
CAPACITY	220 mw
CONSTRUCTION	$ 2,250,000



Pacific Power & Light's recently completed receiving station in the Portland area

OREGON—Spending Up 18%. PP&L Budget Up 23%.

PGE Firms Round Butte

Eugene Water & Electric Board

	REVIEW OF '59
CUSTOMERS	29,000
POWER SALES	450,000 mwh
SYSTEM PEAK	110 mw
CAPACITY	56 mw
CONSTRUCTION	$ 1,735,500

The major plan of EWEB is the start of construction on the Carmen-Smith project on the upper McKenzie River. The 1960 budget contains initial funds for the construction of the 90,000-kw hydroelectric power installation, planned to be completed in September 1962.

Another item of power plant improvement is the installation of semi-automatic supervisory control for the two hydroelectric units located in the Leaburg power plant. This provides remote control from Eugene, Ore., for the plant that is approximately 26 miles upstream on the McKenzie River.

Improvements in the transmission system that are planned involve acquisition of right-of-way for the construction of the 115-kv loop system around the city of Eugene.

The distribution system in 1960 will see an addition to the existing Substation A increasing its capacity to 20,000 kw under forced cooling.

For the past several years EWEB has been converting to and expanding the 120/208 underground business district network system for Eugene, and plans to continue this construction with the addition of approximately $180,000 in funds for the year 1960.

One major addition in Eugene will be the construction of the first section of mercury vapor luminaires mounted on aluminum poles for the downtown Eugene area, replacing ornamental fixtures installed in 1911.

The aggregate of the above items, plus all the miscellaneous system construction, is estimated to be $1,848,820. This figure does not include the amount budgeted for the Carmen-Smith project, and is approximately a 30% increase over similar expenditures for the year 1959.—**R. W. Martin Jr., chief engineer.**

Portland General Electric

	REVIEW OF '59
CUSTOMERS	251,400
POWER SALES	3,993,000 mwh
SYSTEM PEAK	907 mw
CAPACITY	425 mw
CONSTRUCTION	$ 12,100,000

Our 1960 construction program basically consists of the addition of line and substation facilities to handle additional load and improve reliability.

In transmission we anticipate construction of two 115-kv lines, which are a part of our 115-kv and 230-kv overlay system, and nine 57-kv lines to reinforce and improve reliability in our subtransmission system.

In distribution during 1960 we will continue our 2.4-kv and 4.15-kv to 12.5-kv cutover program. We will also increase total feeder capacity by constructing several new feeders and by reconductoring some existing circuits.

Undoubtedly the most notable of our construction activities during 1959 was the completion of our first 230/57-kv, 75/125-mva substation. This substation, named Bethel, is located east of Salem, Ore., and will ultimately become a major 230-kv switching station.—**W. K. Davis, assistant to vice-president.**

Pacific Power & Light

	REVIEW OF '59
CUSTOMERS	288,666
POWER SALES	4,444,276 mwh
SYSTEM PEAK	838 mw
CAPACITY	679 mw
CONSTRUCTION	$ 25,236,000

Expenditures totaling $30,964,000 are budgeted for power production, transmission, distribution, construction and maintenance work in 1960 by Pacific Power & Light Co., Portland, Ore. The work includes a record one-year outlay for improvements and expansion of distribution facilities in customer service areas in Washington, Oregon, Idaho, Montana and Wyoming.

Nearly 300 men working around the clock six days a week are racing to complete the second-stage construction at Seattle City Light's High Gorge Dam on the Skagit River. On completion in 1961, the new dam will have a capacity of 165,000 kw

Power production work is centered at the Dave Johnston steam-electric plant near Glenrock, Wyo., where PP&L is adding a second 100,000-kw unit scheduled to go into service in October 1960. Budgeted for completion of the project is $10,425,000.

The transmission program calls for 92.5 miles of line, including 115,000-kv lines to tie the expanded Dave Johnston plant into the Wyoming system at Casper and a 115/230 circuit from Muddy Ridge to Riverton, Wyo., to handle the growing loads in the Riverton-Lander area, and expansion of 115,000-v circuits in Portland, Ore.—**J. H. Ferguson, news director.**

California Oregon Power

	REVIEW OF '59
CUSTOMERS	92,090
POWER SALES	1,559,825 mwh
SYSTEM PEAK	367 mw
CAPACITY	399 mw
CONSTRUCTION	$ 7,862,000

Central Lincoln PUD

	REVIEW OF '59
CUSTOMERS	11,980
POWER SALES	245,000 mwh
SYSTEM PEAK	53.7 mw
CAPACITY	0
CONSTRUCTION	$ 1,000,000

Grays Harbor County PUD

	REVIEW OF '59
CUSTOMERS	22,000
POWER SALES	356,000 mwh
SYSTEM PEAK	78 mw
CAPACITY	15.5 mw
CONSTRUCTION	$ 1,000,000

UTAH—Budget Up From $14.3 to $20 Million. Power Sales Grow 17%

Utah Power & Light

	REVIEW OF '59
CUSTOMERS	230,000
POWER SALES	3,572,000 mwh
SYSTEM PEAK	672 mw
CAPACITY	761 mw
CONSTRUCTION	$ 14,300,000

Utah Power & Light Co. and its subsidiaries, Western Colorado Power and Telluride Power, have budgeted over $17 million for construction expenditures in 1960.

Planned expenditure of $1.8 million for generation includes $1.5 million to complete construction of the reservoir on Hams Fork River in Wyoming to provide cooling tower make-up and water for other plant uses for the Kemmerer steam-electric project. The first 150,000-kw unit of this ultimate 500,000-kw development, designed to burn subbituminous strip coal, near Kemmerer, Wyo., is planned for operation in '63.

Transmission expenditures of $7.4 million include money to complete 65 miles of 230,000-v line from Nephi to Sigurd, Utah, to deliver additional power to the center of the Telluride Power Co. system. In addition this line will be the first link in the 300-mile line from Salt Lake City to the Arizona-Utah border where it will connect with a similar line to be constructed by the Arizona Public Service Co., thereby interconnecting the two systems. This line also will be used to market power from the Glen Canyon plant of the Colorado River Storage Project when completed. Also budgeted is the initial construction of the 120 miles of 230-kv transmission line from American Falls, Idaho, to Ogden, Utah, and the 230/138-kv terminating substation at Ogden, which will be in service in 1961.

Extension of distribution facilities to new customers and improvements to existing facilities in 1960 are estimated at $7.4 million.

Expenditure of $640,000 for general system improvements rounds out the total of $17.3 million.—**E. A. Hunter, administrative assistant.**

WASHINGTON—Statewide Spending Off 5%. Kwh Sales Up 37%

Chelan County PUD

	REVIEW OF '59
CUSTOMERS	16,576
POWER SALES	440,300 mwh
SYSTEM PEAK	70 mw
CAPACITY	262 mw
CONSTRUCTION	$ 71,871,701

Continuation of construction of Rocky Reach hydroelectric project, a 775,000 kw capacity installation on the main stem of the Columbia River just seven miles north of Wenatchee, will be of primary concern to Chelan County Public Utility District during 1960.

The great project, which will have a total cost of $273 million, is now about 73% complete. First power from the initial unit of the seven to be installed in this stage of development is expected to be delivered July 15, 1961. Five more will go on the line at monthly intervals during 1961 with No. 7 slated for production on Feb. 15, 1962.

An estimated $36,670,000 will be spent on Rocky Reach during 1960.

New or improved distribution facilities are also in the district's plans for 1960. Over a half-million dollars has been budgeted for this work, which will include substation construction or improvement and rebuilding or relocating portions of several 33-kv subtransmission lines. —**Kirby Billingsley, manager.**

Cowlitz County PUD

	REVIEW OF '59
CUSTOMERS	21,398
POWER SALES	
SYSTEM PEAK	130 mw
CAPACITY	97 mw
CONSTRUCTION	$ 550,000

Our 1960 construction program does not include any projects beyond the normal requirements. We plan to construct one new distribution substation and make additions to three existing stations. Our transmission program calls for rebuilding approximately six miles of 69-kv line and the addition of approximately two miles of 69-kv line to our system. Our distribution program includes rehabilitation, reconductoring and extension of lines on our system.

Our 1960 budget is increased over the previous years to enable the completion of projects curtailed or postponed in past years.—**D. E. Hughes, chief engineer.**

Benton County PUD

	REVIEW OF '59
CUSTOMERS	10,150
POWER SALES	200,000 mwh
SYSTEM PEAK	52 mw
CAPACITY	0
CONSTRUCTION	$ 350,000

The district signed a contract in November for the construction of a service center building in Kennewick. The center will incorporate modern customer service features. Included in the plans are a warehouse, shops and offices.

The desired schedule for completion of the structure is Sept. 1, 1960. **—Thomas E. Black, manager.**

Clark County PUD

	REVIEW OF '59
CUSTOMERS	33,785
POWER SALES	571,579 mwh
SYSTEM PEAK	138 mw
CAPACITY	0
CONSTRUCTION	$ 1,280,000

We expect to spend approximately $1,200,000 on system additions and improvements in 1960. The plans call for the rebuilding of the King Street substation, the construction of new dispatching headquarters and approximately five miles of 115-kv transmission line.

15,000 kva in transformer capacity will be added to the system. Approximately 10 miles of heavy 12-kv feeder lines will be run and several regulator stations will be installed. We anticipate that approximately 14,000 kw of residential space heating will be connected to the system, resulting in an average yearly consumption of 12,000 kwh per residential customer.

We are experiencing more interest in underground installations for new subdivisions and expect that several new projects will go to this type of distribution.—**Fred H. Lehman, chief engineer.**

Grant County PUD

	REVIEW OF '59
CUSTOMERS	14,083
POWER SALES	331,000 mwh
SYSTEM PEAK	89 mw
CAPACITY	236 mw
CONSTRUCTION	$ 40,500,000

The letting of a $93,277,690 contract to Grant County Constructors on July 16, 1959, for the construction of Wanapum Dam, six miles below Vantage, marked the start of the second major hydroelectric project by the Public Utility District of Grant County within three years.

Construction was started on Priest Rapids Dam, 18 miles downstream from Wanapum, on July 9, 1956, under a general contract for $98 million. Priest Rapids is now 91% complete and should be finished by December 1960, far ahead of the contract completion date of Sept. 21, 1961.

Priest Rapids has a rated capacity of 788,500 kw and Wanapum a rated capacity of 831,250 kw. All of which means that by the fall of 1964 the two hydro giants will be pouring a total of 1,619,750 kw of power into the transmission lines of the Pacific Northwest.

It is estimated that $32,500,000 will be spent on Wanapum construction during 1960. Work will include the building of cofferdams, the start of pouring of concrete for the right and left bank gravity dams and fishways, and for the power house and spillways.

The Wanapum Dam power house will be 1,540 ft long and will contain 10 generators and space for six future generating units. The 820-ft spillway will contain 12 Tainter gates, each 50x65 ft in size.

Priest Rapids finished in '60

Three generators are now on the line at Priest Rapids under low head operation. The remaining seven are expected to be placed in service during 1960, with all ten generators operating at full capacity by Dec. 1, 1960.

It is estimated that $16,250,000 will be spent on Priest Rapids in 1960. Major remaining work includes completing the installation of the last seven generators, completion of concrete work and miscellaneous work in the power house, finish installation of the spillway gates, and painting.

Some $32,100,000 were spent on Priest Rapids during 1959. In addition to bringing the three generators on the line, all cofferdams were removed, the spillway and fish handling facilities were completed, the power house roof was placed, right and left earth embankments finished and rip rap placed, pulloff structures were completed, and two steel tower transmission lines from Priest Rapids to Midway (about 7 miles) were put in service.—**Herb Jenkins.**

Lewis County PUD

	REVIEW OF '59
CUSTOMERS	11,850
POWER SALES	134,000 mwh
SYSTEM PEAK	34.5 mw
CAPACITY	0
CONSTRUCTION	$ 450,000

We have no new projects proposed for 1960 and all the contracts commenced in 1959 have been completed. Our subtransmission grid has been converted from 45 kv to 69 kv. Our substations have been converted and some rebuilt, all operating at 69 kv.

Our program for 1960 will include replacement of some 1,500 distribution poles, which will be an annual schedule for the next eight or ten years. We anticipate no major construction projects other than normal pole replacement within the next few years.—**Merle D. Johnston, manager.**

Although the power house is still enclosed by the West Bank cofferdam, Chelan County PUD's Rocky Reach Dam has assumed its final outline. First power from the dam will come in 1961. Is rated 775,000 kw

300 ft high and 1,200 ft across, Puget Sound Power & Light Co.'s Upper Baker River Dam now completed

Puget Sound Power & Light

	REVIEW OF '59
CUSTOMERS	217,900
POWER SALES	2,726,000 mwh
SYSTEM PEAK	671 mw
CAPACITY	359 mw
CONSTRUCTION	$ 25,324,000

During 1959 work was continued on the construction of a concrete gravity type dam and power house at the Upper Baker River project. The installation of two 47,200-kva generators was completed and they were placed in commercial operation on Nov. 1. Work on the extension of the power house and the addition of a 64,000-kva generator at the Lower Baker plant is progressing satisfactorily and it is expected that both the Upper and Lower Baker River projects will be completed by Oct. 1, 1960. A 40,000-kva transformer bank and switchbay was added to the March Point substation and seven new distribution substations with a capacity of 23,000 kva were constructed. The capacity of six existing distribution substations was increased by a total of 16,000 kva.

During 1960 work will be started on a 230/115-kv transmission substation near Renton, to receive Priest Rapids and Rocky Reach power, and to integrate it into Puget's 115-kv transmission system. Also to be started in 1960 will be a 115-kv transmission line from Renton to South Bremerton to provide another source of power to the Olympic Peninsula. A 40,000-kva transformer bank will be added at the Eastside transmission substation. Distribution improvements will include about 100 miles of 55-kv and 12.5-kv feeder lines and the construction of 17 new distribution substations with a total capacity of 180,000 kva. Seven existing distribution substations will be increased in capacity by a total of 28,000 kva.

New building construction will include four line headquarters buildings located at Bellingham, Midway, Federal Way and Olympia.

Seattle City Light

	REVIEW OF '59
CUSTOMERS	232,270
POWER SALES	3,828,000 mwh
SYSTEM PEAK	865 mw
CAPACITY	820 mw
CONSTRUCTION	$ 13,825,000

The following resume outlines construction activities that will be continued or commenced during 1960:

Major work in hydraulic plant will be the continued construction of the Gorge High Dam on the Skagit River. Concrete pouring in the arch section is now in progress on a three-shift basis and is rising rapidly to match the gravity section. The new intake and modifications to the existing intake and tunnel, thereby making the new intake operative, will be completed by summer of 1960. All principal items of the Gorge High Dam will be essentially completed during 1960.

Installation of new turbine runners and associated modifications of equipment was completed on two of the four generating units at Gorge power house during 1959. The conversion of the other two units will be accomplished during the first six months of 1960.

Federal Power Commission hearings regarding the proposed Boundary Project on the Pend Oreille River will be completed during the early part of the year. Contingent upon the granting of a construction license, and the terms thereof, we will proceed with final engineering and possibly commence preliminary construction.

Foundation exploration, by drilling programs, will be performed during 1960 at the Copper Creek site, on the Skagit River, and also on Thunder Creek in the vicinity of its confluence with Macallister Creek.

The conversion of our Cedar Falls hydro plant to automatic operation, work now in progress, will be completed this year. Also, the cement mortar lining of penstocks at Cedar Falls, commenced during 1959, will be completed during 1960.

Transmission plant construction will be primarily line work consisting of some local 115-kv construction, the completion of rebuilding the Cedar Falls line from 55 kv to 115 kv and the construction of a three-way tie between the 115-kv lines from Cedar Falls—Tacoma—South substation. Filling of our Tukwila substation site, commenced in 1959, will be completed this year. Engineering and possible construction, during late 1960, of the 230-kv Valley-Tukwila-Duwamish transmission line will commence. This line will tie our future Tukwila and existing Duwamish substations to the Bonneville Power Administration's Valley sub. This construction will also include an additional 230-kv breaker position at Duwamish sub. Principal construction of this line will occur during 1961.

One major item of construction in the distribution category will be the continued conversion of our Canal substation from 55-kv to 26-kv subtransmission. This project includes new bus structures, modifications to existing structures, installation of two new 75,000 kva-115 kv to 26 kv transformer banks with associated equipment and 13 new 34.5-kv air blast circuit breakers. Conversion of this station should be completed during 1960.

Other items of construction under our continual program of expanding and improving our distribution system are the installation of eight unit substations and modifications to others, thereby adding 41,000 kva of capacity.—**H. V. Strandberg, chief engineer.**

Washington Water Power

	REVIEW OF '59
CUSTOMERS	149,080
POWER SALES	3,015,000 mwh
SYSTEM PEAK	633 mw
CAPACITY	716 mw
CONSTRUCTION	$ 20,403,000

The Washington Water Power Co.'s Noxon Rapids hydroelectric station should be completed early in 1960. When completed, it will cost an estimated $87 million, and will have a 400,000-kw initial capability, with provision for an eventual 500,000 kw. It is the 11th hydroelectric station built and operated by WWP.

Completion of Noxon will approximately double WWP's generating capability.

WWP has budgeted $1,095,200 as its share of the cost of a 230-kv transmission line connecting its system with that of the Idaho Power Co. Estimated cost includes necessary substation, transformers and related installations.

WWP has budgeted $352,000 for construction of a line from Grangeville, Idaho, to Elk City, Idaho. The Elk City area is one of the few places in the Northwest still without electric service. WWP offered to provide the area with electric service after the REA in the area had declined to do so.—**Alden F. Elder, treasurer.**

Pacific Northwest Power

Pacific Northwest Power Co. has presented an amended application for license to build the High Mountain Sheep Dam on the Snake River. Hearings are pending, and it is hoped that a favorable decision will be reached by the end of the year. If clearance is obtained during 1960, the 2 million kw, $250 million project would start in 1961 with first power flowing in 1966.

Tacoma City Light

	REVIEW OF '59
CUSTOMERS	63,601
POWER SALES	1,694,510 mwh
SYSTEM PEAK	405 mw
CAPACITY	315 mw
CONSTRUCTION	$ 1,589,000

The major construction activities of City Light during 1960 will be:

1. Work is being renewed at the Mayfield hydro plant site. This project, consisting of three 40-mva units, is a part of our Cowlitz power development. Active construction during 1960 will involve the tunnel, fish facilities, power house, dam, switch yard, penstocks and forebay. The schedule calls for service by April 1, 1962. The year 1960 should represent a $10,000,000 construction expenditure of the expected $23,000,000 total.

2. The presently manned Nisqually substation will be converted to supervisory control in the summer of 1960. This 15,000-kva station in conjunction with Central substation, also 15,000 kva, handles the total underground load for the main downtown area of Tacoma. Central substation is, at present, supervisory controlled from Nisqually substation. The control points for both Nisqually and Central substations will be located in the load dispatcher's office in the utilities building.

3. The city of Tacoma will start construction soon on a 230/105-kv substation rated 450,000 kva. The first step will consist of one 150,000-kva, 230/105-kv bank and four 105-kv lines, which will feed the fast growing industrial area of the city. This will be a main receiving station.—**R. M. Boyles, chief electrical engineer.**

Snohomish County PUD

	REVIEW OF '59
CUSTOMERS	59,000
POWER SALES	1,060,229 mwh
SYSTEM PEAK	231 mw
CAPACITY	0
CONSTRUCTION	$ 2,250,000

Prospects for continued growth in Snohomish County look very promising. The Public Utility District will spend $11,938,956 in 1960, the largest amount budgeted in 10 years of operation.

The record construction budget for the year totals $3,909,901. Items of most importance include additions to the Everett substation involving an expenditure of $630,000. This substation is located in industrial Everett and is an important link in the district's grid system.

Also to be constructed in Everett and the surrounding area is the addition of a third circuit to Paine Field No. 2 substation, additions to the Lake Stevens substation, and completion of the 55-kv line from Beverly Park to Paine Field. all involving an expenditure of $60,000. A substation costing $110,000 is contemplated for the Mukilteo area.

In the fast growing south county area $325,000 will be expended in making additions to the Five Corners, Lynnwood, Alderwood substations and the construction of a 55-kv line from Paine Field to Halls Lake.

To improve service to Monroe and provide additional sources of power for the Snohomish-Monroe areas a new 55-kv line will be built between Lake Stevens and Monroe, and the Machias-Monroe and Cathcart-Monroe lines will be constructed to carry higher voltages. Cost of these projects is $255,000.

A forward step was made in providing $150,000 for the purchase of a mobile substation.

Budgeted for meters, transformers, line extensions, etc., are $1,555,000. For tools, laboratory, automotive and radio equipment are $172,125.—**A. S. J. Steele, manager.**

White water down stream from Grant County PUD's Priest Rapids development

Honolulu's Ala Moana shopping center will have 11.5-kv underground distribution system—total demand of 11,000 kva

HAWAII—Spending Zooms Up 65%, Jets Pace New Tourist Boom

Hawaiian Electric

	REVIEW OF '59
CUSTOMERS	110,882
POWER SALES	1,183,200 mwh
SYSTEM PEAK	279 mw
CAPACITY	400 mw
CONSTRUCTION	$ 9,500,000

Construction was completed on a 14-mile 138-kv line from Waiau generating station to Koolau switching station. This line will operate at 44 kv until Waiau No. 6 is placed in operation in 1961.

The rapid industrial growth caused by the construction of an oil refinery, a steel mill and two cement plants in the Ewa area necessitated the expansion of our transmission capacity in this area. Fifteen miles of 44-kv transmission line were constructed during 1959 in the Ewa area, with an additional 12 miles scheduled for construction in 1960.

Construction of Waiau No. 5 generating unit was completed in latter 1959. This new 50-mw unit went into commercial operation on Oct. 10, 1959, with a tested capability of 60 mw.

The total distribution substation capacity was increased by 45,475 kva.

Distribution systems for 37 subdivisions totaling 2,425 homesites were completed. Approximately 30,000 kva of distribution transformer capacity was added during the year. The downtown underground secondary network system capacity was increased by 2,000 kva.

A 11.5-kv underground distribution system was installed in "Phase A" of the Ala Moana Shopping Center. Phase A of this installation has 8,250 connected kva and will have a peak demand of 6,000 kva. "Phase B" will have an additional 7,000 connected kva and will have a peak demand of 5,000 kva; resulting in a total demand of 11,000 kva for the shopping center.

An Enns power network computer is on order for installation in 1960 to provide a more rapid means of solving system expansion problems. **—L. W. Lengnick, vice-president and executive engineer.**

Hilo Electric Light

	REVIEW OF '59
CUSTOMERS	18,470
POWER SALES	80,909 mwh
SYSTEM PEAK	21.5 mw
CAPACITY	34.5 mw
CONSTRUCTION	$ 546,415

The most immediate boost to the economy of the Island of Hawaii will come from the tourist industry.

With the increase in the tourist industry, new airport facilities, new roads and new small boat harbors, which are already in the planning stage, will become a reality. At the same time real estate activities will pick up and commercial and industrial businesses will grow accordingly.

The Ralph A. Parsons Co. made a study of the Island of Hawaii to determine whether this island was suitable for a satellite launching station. We have been following this very closely, and the latest word indicates that the project has not been set on any priority. However, a lot of pressure is going to be brought to bear, both by space agencies and by our state government, to get the propect put on a priority list. If a satellite launching station is built here the plans call for a nuclear power plant.

A transmission line of approximately five miles is being built to serve the Hawaii Prison System's Kulani project which is located approximately in the middle of our island. A portion of our 49 distribution line miles will also be built to serve that area.

The transmission substation transformer capacity of 1,000 kva is being built to serve the Kulani project. **D. W. Rose, administrative assistant.**

Maui Electric

	REVIEW OF '59
CUSTOMERS	10,455
POWER SALES	82,900 mwh
SYSTEM PEAK	13.5 mw
CAPACITY	23 mw
CONSTRUCTION	$ 200,000

The relocation of families of the Hawaiian Commercial & Sugar Co. has created a sudden demand on the Maui Electric Co. for new construction that may cost over $300,000.

The new subdivision will boast a modern semi-underground system. Pad-mounted transformers will be installed throughout this subdivision, which may eventually have 2,000 homes.

Our substation No. 8, which is located in this area, will require new feeder breakers, additional transformer capacities, and circuit rearrangement to handle the new load.

A 1,500-kva tap-changing transformer is slated to be installed this year in the Wailuku area, and preparations are already under way. The

outgoing load from this new substation will be fed over a new spacer aerial cable system.

An 8½-mile, 23-kv transmission line extension is under way to East Maui. This new line extension will pick up a distribution system currently supplied by a small automatic hydroelectric plant.

Waiahi Electric

	REVIEW OF '59
CUSTOMERS	3,896
POWER SALES	17,799 mwh
SYSTEM PEAK	4.5 mw
CAPACITY	0
CONSTRUCTION	$ 100,868

ALASKA—Spending Doubles in '60—Pressure Builds Up For Federal Projects

Anchorage L&P Dept.

	REVIEW OF '59
CUSTOMERS	9,297
POWER SALES	74,256 mwh
SYSTEM PEAK	17 mw
CAPACITY	6 mw
CONSTRUCTION	$ 470,000

With respect to 1960 projects, there is only one of any consequence that might be of interest. It is expected that we will design and install a 3,750-kva unit substation in the urban renewal area on the south side of the city.—**Lyman L. Woodman, administrative assistant.**

Fairbanks Electric Utilities

	REVIEW OF '59
CUSTOMERS	4,565
SYSTEM PEAK	7.8 mw
CAPACITY	8.5 mw
CONSTRUCTION	$ 100,000

Major construction during 1960 will be as follows:

A 5,000-kw capacity, 12.5-kv intertie line between the system's power plant and the power plant at the Ladd Air Force Base, $185,000.

A 2,500-kva, 12.5/4.16-kv substation, $85,000.

Additions, betterments and general rehabilitation of the electric distribution system, $250,730.—**L. L. Glascoe, administrative assistant.**

Ketchikan PU

	REVIEW OF '59
CUSTOMERS	3,214
SYSTEM PEAK	7.6 mw
CAPACITY	9 mw
CONSTRUCTION	$ 40,000

Our organization will undertake the following projects during 1960:

One mile of new line construction within the city limits. This work entails moving of distribution line from our Bethe substation at 4,160 v, secondary services, telephone and TV cables.

One mile of new line on North Tongass Highway to improve service and take primary burden from older section of line.

Revamp secondary and service lines over approximately a six-block area of downtown area and retire some old open primary lines with use of aerial cable and trim line.—**Don D. Bowey, electrical superintendent.**

Alaska Electric Light & Power

	REVIEW OF '59
CUSTOMERS	3,318
POWER SALES	25,334 mwh
SYSTEM PEAK	5.7 mw
CAPACITY	4 mw
CONSTRUCTION	$ 125,700

The site of proposed Mica Creek Dam on the Upper Columbia River north of Revelstoke in British Columbia. Construction of Mica Creek would have great advantage in firming down-stream power

WESTERN CANADA—Expenditures Grow 14%. Peace River, Upper Columbia Projects May Firm in '60

B. C. Electric

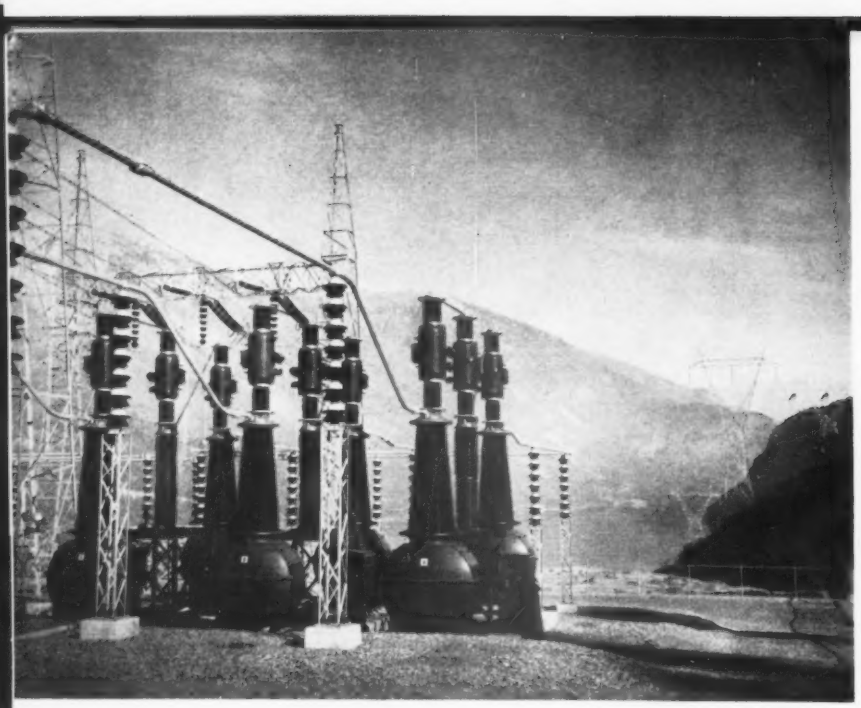
	REVIEW OF '59
CUSTOMERS	339,816
POWER SALES	3,318,788 mwh
SYSTEM PEAK	804 mw
CAPACITY	969 mw
CONSTRUCTION	$ 62,000,000

During 1959, $62,000,000 were spent on the B.C. Electric's expansion program necessary to meet the electrical needs of its service area. For 1960 a further $58,000,000 is budgeted so that new generating, transmission and distribution facilities can be provided to continue this program. In December a peak one-hour demand of 804,000 kw was realized and the annual electrical energy sales were approximately 9.6% higher than the 3,028 million kwh sold in 1958.

The total installed generating capability at the end of 1959 amounted to 968,700 kw of which 100,000 kw are attributed to the Port Mann gas turbine generating station added to the system during 1959. This installation, commissioned in September, represents the first major plant to generate electricity by thermal means that B. C. Electric has added to its system.

Approximately 125 miles north of Vancouver the final stages of the Bridge River development were well under way. During 1959 two 62,000-kw generators were placed in service at the company's Bridge River No. 2 generating station. The electrical output of these generators is stepped up to 360 kv for transmission and fed to the newly established Portage switching station where the outputs of the new plant and the existing Bridge River No. 1 plant will be combined. From Bridge River No. 1, ties to the 230-kv transmission system and the local 60-kv transmission system are still maintained.

Each generator at Bridge River No. 2 is rated at 82,000 hp. Two units identical to those installed in 1959 will be placed in service in Bridge River No. 2 and the plant will be operated at the higher head



360-kv air blast circuit breakers form a part of the Bridge River transmission system, B. C. Electric's new portage switching station. Here outputs from Bridge River No. 1 & No. 2 are combined and transmitted to the lower mainland at 360 kv

when the reservoir behind the new dam is filled. At the same time the head will increase on Bridge River No. 1 plant and it is expected under favorable conditions that the plant peak output will increase by 20,000 kw. Creation of the new reservoir will make necessary the relocation of approximately 30 miles of highway in the Bridge River valley and a similar length of 60-kv transmission line which connects the Bridge River No. 1 plant with the single 22,000-kw unit at LaJoie Dam.

Work continued on the company's second major thermal project, Burrard thermal generating station, and good progress was made in 1959. The plant, located on Burrard Inlet, approximately 10 miles from the city center, is designed to house four steam turbine driven generators each rated at 157,500 kw, with space provision for a further two units. The present plans call for the first unit to be commissioned in April 1961, the second to be in service in August 1962, the third in 1964 and subsequent units as required by load. Provision is made in the design of the plant so that the boilers can operate with either natural gas or oil as a fuel. The output of the station will feed into the electrical system over 230-kv transmission lines. Initially two 230-kv lines will connect the plant to the system and, since the first unit is scheduled for April of 1961, it is planned that the transmission link will be completed in 1960 so that final tests of the thermal station can be completed before April 1961.

Transmission projects in 1960, in addition to the construction of 22 miles of 60-kv line to tie in new distribution substations, will include continuing work on the Bridge River-Cheekye 85-mile transmission line which will be designed and constructed for operation at 360 kv but which will initially go in service at 230 kv. This line will strengthen the transmission ties between the Bridge River generating plant and the load area. The transmission line is scheduled for completion in 1961 but work will continue in 1960. Work will commence on a third 132-kv transmission line on Vancouver Island to supply energy to southern Vancouver Island from Stratford, the western terminus of the Vancouver Island-Mainland submarine cable interconnection.—**J. H. Steede, vice-president and chief engineer.**

B. C. Power Commission

	REVIEW OF '59
CUSTOMERS	84,000
POWER SALES	1,590,000 mwh
SYSTEM PEAK	304 mw
CAPACITY	445 mw
CONSTRUCTION	$ 9,915,000

During 1960 the power commission will be neither starting nor continuing major projects.

The installation of additional diesel units in several of our fueled generating stations totaling some 14,000 kw will be undertaken and the normal expansion of transmission and distribution lines and substation transformers.—**R. C. McMordie, manager, engineering and operations.**

Edmonton EL&P Dept.

	REVIEW OF '59
CUSTOMERS	76,348
SYSTEM PEAK	155 mw
CAPACITY	180 mw
CONSTRUCTION	$ 6,102,000

Canadian Utilities

	REVIEW OF '59
CUSTOMERS	42,000
POWER SALES	207,000 mwh
SYSTEM PEAK	66 mw
CAPACITY	86 mw
CONSTRUCTION	$ 2,800,000

Continued growth in company services is reflected in the 1959 capital works program of $2,680,000.

A 113-mile extension of a 69,000-v transmission line from Willingdon to Bonnyville to Cold Lake Air Base is planned at a cost of over $800,000. When completed, this line will serve as an alternate source of supply for this area. Another $65,000 is earmarked for an 11-mile, 69,000-v line from Battle River to Galahad. More than $158,000 are set aside for substations and $225,000 will go for transformers and regulators. Extensions to oil fields will cost another $126,000.

In addition, a capital expenditure of $208,000 is slated for the company's three subsidiary companies. This includes extensions to McMurray Light & Power Co. Ltd. along with installations for Yukon Electric Co. in Whitehorse.

During the year an estimated $800,000 will be spent to extend rural electrification to another 750 farms. The three major projects under way include completion of the Sturgeon to Swan Hills transmission line, the new gas turbine in Vermillion plant and addition to Sturgeon plant, while the third project is the extension of the 69-kv line from Bonnyville to Cold Lake Air Base.

Calgary Power

	REVIEW OF '59
CUSTOMERS	106,000
POWER SALES	1,620,000 mwh
SYSTEM PEAK	392 mw
CAPACITY	409 mw
CONSTRUCTION	$ 10,500,000

The Spray and Rundle hydro plant extensions will be commissioned in the autumn of 1960. A 50,000-kw unit will be added to the Spray plant, doubling its capacity, and a 30,000-kw unit will be added to the Rundle plant – present capacity 17,000 kw. The cost of these extensions will be some $6,500,000.

Preliminary work is in progress at the Big Bend hydro power site on the Brazeau River.

The initial unit is now scheduled for completion by the autumn of 1963. Output will be 150,000 kw. The cost of this initial development will be some $45,000,000.

Engineering and design work on the 150,000-kw unit for the Wabamun steam plant is progressing according to schedule. This third unit will burn coal from the strip coal field adjacent to the plant. The $1,500,000 stripping dragline, which will remove the earth and shale overlying the coal, will be the second largest in Canada. It is on order from England for delivery in the spring of 1961.

To get the Wabamun strip mine into operation will cost some $4½ million; about 50 men will be employed in producing coal.

The third unit at the plant, which will be coal fired, will cost some $18,000,000 and is scheduled to be commissioned in the autumn of 1962.

These developments when completed will represent 380,000 kw of additional capacity from 409,000 kw to 789,000 kw, an increase of nearly 93% over the five years 1958 to 1963. This compares with an increase of nearly 119% over the previous five-year period, 1953 to 1958.

The industrial load increased by 125,000,000 kwh during 1959. The general industrial upswing that took place during the year increased the demand for power. It is expected that the industrial load will increase even more in 1960.

Over 1,400 miles of new farm lines were built, bringing the total mileage of farm lines to 25,047 miles, enough miles to circle the earth.

It is estimated that around 1,700 new farms will receive power in 1960.

FEDERAL—Corps of Engineers

AGENCIES—Bonneville Power Administration
—Bureau of Reclamation
—Rural Electrification Administration

Corps of Engineers

● The Dalles project, located on the Columbia River, is being constructed with an initial installation of fourteen 78,000-kw main units, two 13,500-kw fishwater supply units and two 3,000-kw station service units. Power house substructure to increase the ultimate installation to 22 main units has been provided with the initial construction. The fishwater supply units and 10 main units are in commercial production of power. The remaining four units will be placed in operation at three-month intervals during 1960. All major construction features of the project have been completed.

● Hills Creek project will consist of a flood control reservoir and a power house. The power installation will be two 15,000-kw units. Construction of the dam and appurtenances has progressed to about 75% completion. Advertising is scheduled for early 1960. Power-on-the-line is scheduled, first unit December 1961, second unit March 1962.

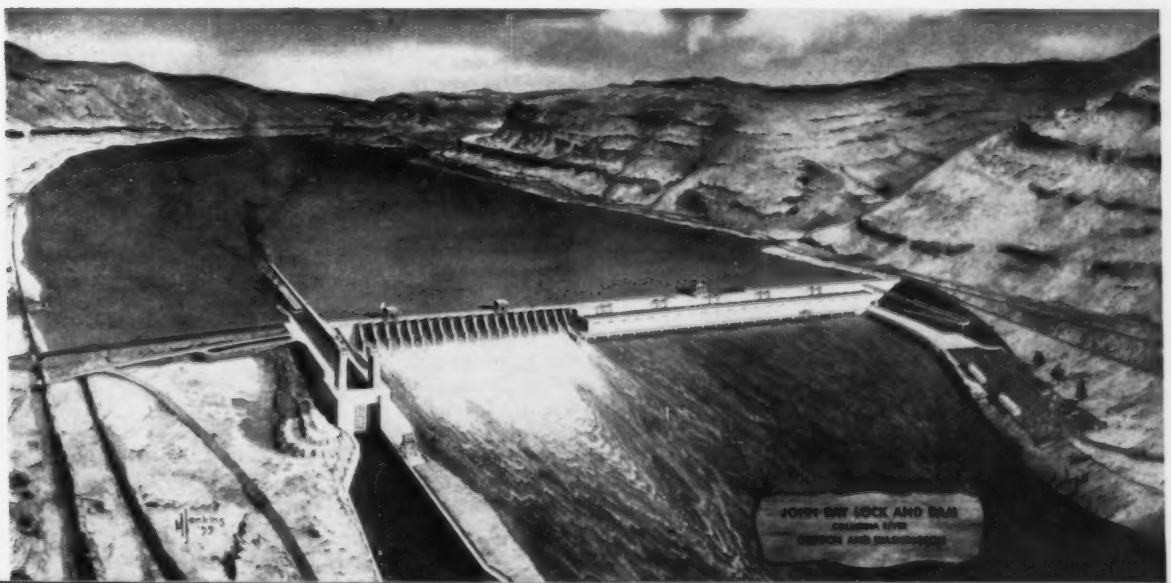
● Cougar project will consist of a flood control reservoir and a power house. The initial power installation will be two 12,500-kw units. Clearing of the dam site and reservoir areas and major road relocations have been completed. Plans and specifications are being prepared for secondary road relocations, power house construction and procurement of power equipment. Power-on-the-line is scheduled for November 1962.

● Bruces Eddy Dam and reservoir has had a considerable amount of exploratory work undertaken and completed. While this dam has not been officially approved as a multipurpose project, it has had a liberal appropriation for exploratory work and reservoir study at its site.

● Over-all construction work at the $130 million Ice Harbor Lock and Dam is rated as well past the 50% mark, with the South shore construction work made up of 7½ spillway bays, nonoverflow section, power house intake structure and fish ladder being near the 100% completion mark. There remains only some channel excavation under the South shore $30,000,000 contract to complete the job. The $7,000,000 power house completion contract is rated as 68% complete.

Fifteen supply contracts are in effect, calling for the manufacture of three 143,000-hp turbines, three

Artist's conception of John Day Dam now being constructed under the supervision of the U. S. Army Engineers. John Day will be in commercial operation in 1967, will have an ultimate capacity of over two million kw. Total cost will be $418 million



gantry cranes, fishway pumps, substation control centers, switchboards, switch gear and three 94,737-kw generators.

● As of Jan. 1, 1960, five construction contracts and one supply contract were in effect at the John Day Dam site at river mile 216.3 on the Columbia River. Over 1,100,000 bbl of cement, 38,000 tons of pozzolan, 28,000,000 lb of reinforcement steel, 18,000 lb of polyvinylchloride, along with 2,000,000 lb of structural and low alloy steel, have been estimated for the job. Approximately 4,000,000 cu yd of common excavation, rock excavation, impervious fill, filter, rock fill and riprapping are included in the work.

Present schedule at John Day calls for completion of the North shore construction work by August 1962, with a tentative power-on-the-line by June 1967. John Day Lock and Dam has a revised estimated cost of $418,000,000.

● Lower Monumental Lock and Dam, 31 miles above Ice Harbor Dam on the Snake River, while still in the planning stage, has progressed to a definite location site status, with exploratory drilling having been carried on the entire length of its potential reservoir.

● Albeni Falls Dam on the Pend Oreille River in northern Idaho and Chief Joseph Dam on the Columbia River in north-central Washington are the only power projects under the Army Corps of Engineers' jurisdiction in the U. S. Army Engineer District, Seattle. No new generation was added at either project in 1959 and no new units are scheduled for the future.

Bonneville Power Administration

	REVIEW OF '59
CUSTOMERS	118
POWER SALES	29,100,000 mwh
SYSTEM PEAK	4,559 mw
CAPACITY	5,877 mw
CONSTRUCTION	$ 18,650,000

Peak energy demand on the federal plants was 4,559,000 kw 5 to 6 p.m., Aug. 17, 1959, a decrease of nearly 7% from the 1958 peak of 4,900,000 kw. New generator units added during the year had a total rated capacity of 312,000 kw and included four 78,000-kw units at The Dalles.

U. S. Columbia River federal plants produced 30,600,000,000 kwh for Bonneville Power Administration during 1959 for transmission over the BPA transmission grid to 118 customers. The revenue from the sale of power was $67,400,000 for 1959. Generation increased over 4% as compared to 1958 and revenues for 1959 increased over 5%.

The Big Thompson power plant on the Colorado—Big Thompson project in Colorado went into commercial operation April of '59 adding 45,000 kw of USBR power to the area

Expenditures for new and improved facilities during 1959 amounted to $18,650,000 as compared to $23,400,000 the previous year. Approval of the present budget before Congress would provide an estimated $23 million for construction in 1960. Contract construction work in 1960 is expected to total over $5 million compared to $3,550,000 in 1959.

Transmission system additions during 1959 included completion of 97 circuit miles of high voltage transmission line, primarily 115 kv and above and 216,000 kva of transformer capacity. Major grid additions completed during the year will meet the rapidly growing power requirements of southwest Oregon, central and western Washington, and northwest Montana.

Major transmission construction under way is the 345-kv, 128-mile line from the Chelan County PUD's Rocky Reach hydroelectric project to Maple Valley near Seattle to bring the output of the project to western Washington; the 125-mile, 287-kv line between Tacoma and Columbia that will be connected to Grand Coulee No. 3 at Columbia, and a 40-mile, 115-kv line from Albany to Toledo, Ore.

Major new starts scheduled for 1960 include an 81-mile, 345-kv line for initial 230-kv operation between Big Eddy near The Dalles Dam and McLoughlin near Oregon City, to supply the northern Willamette load growth; the 40-mile, 115-kv line between DeMoss and Fossil, and a 130-mile, 115-kv line between Redmond and Burns to bring direct service to central Oregon area.s—**Wilbur P. Staats, information officer.**

Bureau of Reclamation

● Installation of the final generator, scheduled to be completed in July 1960, will bring the Boulder Canyon Project's Hoover power plant to its full capacity of 1,344,800 kw.

● Seven bids for manufacture of the eight turbines for the Glen Canyon power plant were opened Nov. 24, 1959. Award of the contract to the successful bidder has not yet been announced. Bids on the eight generators have not yet been invited.

Glen Canyon power plant is under construction on the Colorado River near the downstream toe of Glen Canyon Dam, 12 river miles downstream from the Arizona-Utah state line. Construction of the dam and power plant, principal features of the Storage Project, is about 30% completed. The 900,000-kw power plant will rank third among the bureau's power plants, exceeded in capacity only by Grand Coulee and Hoover power plants.

● Construction of the Flaming Gorge Dam and power plant was about

18% completed by January 1960. The dam and power plant, major features of the Storage Project, are on the Green River in northeastern Utah, about six miles south of the Utah-Wyoming state line. The 108,000-kw power plant, to be constructed at the toe of the 490-ft high concrete arch dam, will have three 36,000-kw generators. First power is expected to be produced in the summer of 1963.

• Major contracts for construction completed in August 1959 on the project's Talent Division, near Ashland in southwestern Oregon, included those for the Green Springs power plant, Keene Creek Dam and the Green Springs power conduit. Green Springs power plant has a single 16,000-kw generator. The plant is scheduled to be placed in commercial operation this spring.

• In June 1959, construction began on the project's Upper and Lower Molina power plants. The Upper Molina power plant will have a single 8,400-kw generator and the Lower Molina plant will have a single 4,600-kw generator. Work on the plants is scheduled to be completed in August 1961.

Invitations are expected to be issued in April 1960 for completion of construction of the Upper and Lower Molina power plants and switchyards. In May, bids are expected to be invited calling for furnishing and constructing a 22.5-mile long, 69-kv wood-pole transmission line on the project.

• The 24,000-kw Glendo power plant on the Glendo unit of the project in Wyoming began commercial operation in April 1959. The plant, housing two 12,000-kw generators, is on the North Platte River near the town of Glendo. By the end of 1959, the contract for construction of the 48,000-kw Fremont Canyon power plant, also on the Glendo Unit, near Alcova, Wyo., was essentially completed. The plant is expected to be placed in service this summer.

• Construction began in June 1959 on the 140-mile-long Kortes-Cheyenne 115-kv wood pole transmission line in Wyoming. The line will run from the project's Kortes power plant to a substation near Cheyenne. At the end of 1959, construction was under way on the following transmission lines:

Fort Peck, Mont.—Bismarck, N. D., 230-kv, 310 miles long, 85% completed

Fargo, N. D.—Granite Falls, Minn., 230-kv, 165 miles, 92% completed

Bismarck—Jamestown, N. D., 230-kv, 100 miles, 5% completed, and

Boysen power plant—Pilot Butte power plant, Wyo., 115-kv, 37 miles, 80% completed.

Invitations to bid on the following transmission line work are expected to be issued this winter and spring:

About January 1960: Clearing right-of-way, constructing footings, furnishing and erecting steel towers for about 57 miles of 230-kv line extending from Oahe switchyard, north of Pierre, to Fort Thompson substation, S. D.

About February: Furnishing and constructing 110 miles of 115-kv wood-pole line having a short section of steel tower construction, between Riverdale, Minot and Rugby, N. D.; clearing right-of-way, constructing footings, furnishing and erecting steel towers for about 83 miles of 230-kv line, between Jamestown and Fargo, N. D.

About March: Furnishing and constructing 67 miles of 115-kv wood-pole line between Cheyenne, Wyo., and Sidney, Neb.

About April: Furnishing and stringing conductors and overhead ground wires for the 99-mile, 230-kv Bismarck-Jamestown No. 2 line, N. D.

About May: Furnishing and constructing 110 miles of 115-kv wood-pole line between Jamestown and Grand Forks, N. D.

About June: Clearing right-of-way, constructing footings, furnishing and erecting steel towers for about 140 miles of 230-kv line between Garrison and Jamestown, N. D.

Rural Electrification Administration

During calendar year 1959, REA approved a total of $29,561,600 in loans to electrification borrowers in the 12 Western states. The loans will enable the borrowers to provide electric service to an estimated 9,600 new rural consumers, and to add approximately 4,700 miles of line to their systems. They also provide for an additional 3,300 kw of generating capacity and extensive system improvements.

The 1959 lending activity brought to $561,331,695 the cumulative total of loans approved to active REA borrowers in this section of the country.

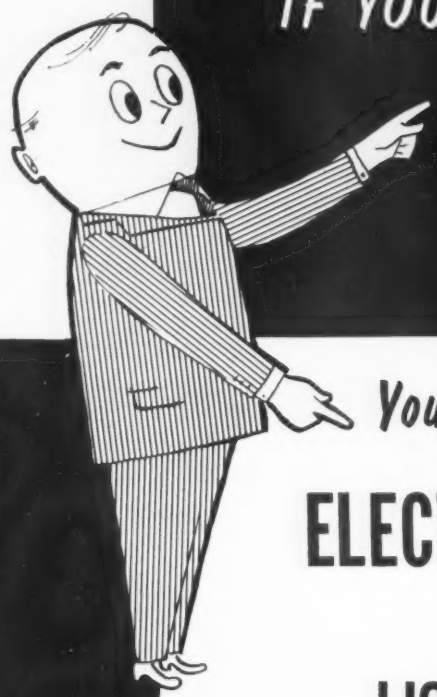
The 157 active REA-financed electric systems in the Western states were serving a total of 381,640 consumers over 142,163 miles of line on Oct. 1, 1959. In addition, 19 former borrowers were providing service to 15,335 consumers over 4,142 miles of line by the time they had repaid their REA loans in full. As of June 30, 1959, more than 95% of all the farms in the 12 states were receiving central station electric service.

As of Dec. 1, 1959, REA electric borrowers in the Western states had made payments of $131,014,303 on their loan obligations. This included $72,213,134 repaid on principal, $41,052,049 paid in interest and $17,749,120 paid before due dates.

REA loans were approved to four new electrification borrowers during 1959. All of these new borrowers are located in the Western area. They are: Dillingham Public Utility District No. 1, Dillingham, Alaska; Naknek Electric Assn. Inc., Naknek, Alaska; White Mountain Power Co-op,. Dyer, Nev.; Wells Rural Electric Co., Wells, Nev.

Status of Western REA-Financed Electric Systems

State	1959 Loans	January 1959 Annual KWH All REA Consumers	January 1959 Annual KWH REA Farm Consumers	Per Cent Farms Served by REA Borrowers
Alaska	$4,237,000	5,832	7,188	57.1
Arizona	3,454,000	9,384	4,080	28.1
California	274,000	4,332	6,036	5.7
Colorado	1,633,000	5,496	4,008	60.2
Idaho	1,277,000	8,196	6,768	18.8
Montana	1,111,600	6,468	6,564	64.7
Nevada	2,269,000	14,148	11,268	13.3
New Mexico	4,229,000	6,096	2,748	63.8
Oregon	6,140,000	12,276	8,820	20.8
Utah	250,000	11,112	4,140	11.7
Washington	1,502,000	15,740	10,932	20.3
Wyoming	3,155,000	10,824	4,512	82.1



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ELECTRICAL WEST
Construction News

For
- contractors
- consulting engineers
- lighting engineers
- wiring designers
- distributor salesmen
- all interested

Electric Week events

National Electrical Week plans include many special events and meetings, details for some of which were a bit late in being finalized and announced. Among them are the Intermountain Electrical Assn. 1960 annual conference, which Manager Bob Trottier announced as a one full day meeting, Feb. 11, Thomas Edison's birthday, at Hotel Utah. Its program will culminate with the new Nela Park "Lamparade" put on by Alston Rodgers, an adept showman. . On Saturday of the same week, Feb. 13, the Snake River Valley Electrical Assn. holds its annual conference in Boise and may possibly have the same feature as its high light.

Trade Show

Sacramento Valley Electric League's Construction Section will stage its first "Progress in Electrical Equipment" trade show for contractors, architects, maintenance people, etc., at Sacramento Inn, on Arden Way and North Sacramento Freeway, March 8-10. All 37 of its exhibit booths have been sold, it was announced at the monthly meeting of the Construction Section Jan. 20. Invitations will be sent to customers of Sacramento's supply distributors, commercial and industrial customers of SMUD and PG and E within a 100-mile radius.

Launched

Contra Costa County Chapter of Electrical Maintenance Engineers Assn. of California got off to a healthy start at its first meeting, held in Antioch, Calif., Jan. 20, with an attendance of 60 enthusiastic maintenance men, contractors, supply distributors, service shop people, utility and manufacturers' representatives. Floyd McNeil proved an able chairman. He is chief electrician of Western California Canners. Three past presidents from the parent association in Los Angeles spoke, telling the benefits they had gained through this education and fellowship organization: Charles Hays, Electrical Estimators Inc.; Jack Singleton, now with Pacific Coast Steel at Hayward; and Emerson Reichard, retired.

William J. Varley (center) presiding, he said, for the last time as manager of the San Francisco Electrical Contractors Assn. at that group's and San Mateo Chapter NECA's Christmas party, told that he now will be executive manager of the joint Electrical Construction Industry fund for San Francisco County. Robert Coleman (left) succeeded him as manager of San Mateo Chapter and Robert Frank (seated, right) becomes San Francisco Chapter manager. . . Coleman announced since then the re-election of Everett L. Marshall as president, William Gillard governor, Carl Porter vice-president, Stanley Fitschen, secretary-treasurer and Ernest Canete, Jim Hawks, Norman Hughes, W. D. Rigler and Fred Spatz as directors of the San Mateo Chapter, NECA.

"Greatest challenge facing the electrical contractors in the West is the development of bigger and better administrative and field organizations to handle increased technical business brought about by phenomenal growth of electronic and technical plant expansion," said Harry F. Fischbach (right), founder and board chairman of Fischbach & Moore, who visited his Western job sites and offices last month. With him in the photo are Robert E. Coe, assistant vice-president, and F. S. Kellstrom, Western division vice-president and general manager, regional office, Los Angeles. The firm, one of the world's largest electrical contracting firms, was just awarded the $3.4-million contract for electrical installation at Los Angeles International Airport.

P. Harry Byrne, 72, past president of the Denver Electrical Contractors Assn., died Jan. 9. He operated his own electrical contracting business until he retired three years ago.

Antitrust indictments have been returned by the Federal Grand Jury in Houston against the Southeast Texas Chapter, NECA, Charles Scholiko, its former manager, included.

Renamed

NISA becomes EASA on April 1. The name of the motor and apparatus service association, National Industrial Service Assn., long under discussion for change, has now been officially renamed Electrical Apparatus Service Assn., as being more descriptive of its scope. Taking office in May will be George Larsen of Larsen-Hogue Electric Co., Los Angeles (Carl Lundberg of Seattle is treasurer of the organization). Dues have also been increased and some policy changes voted.

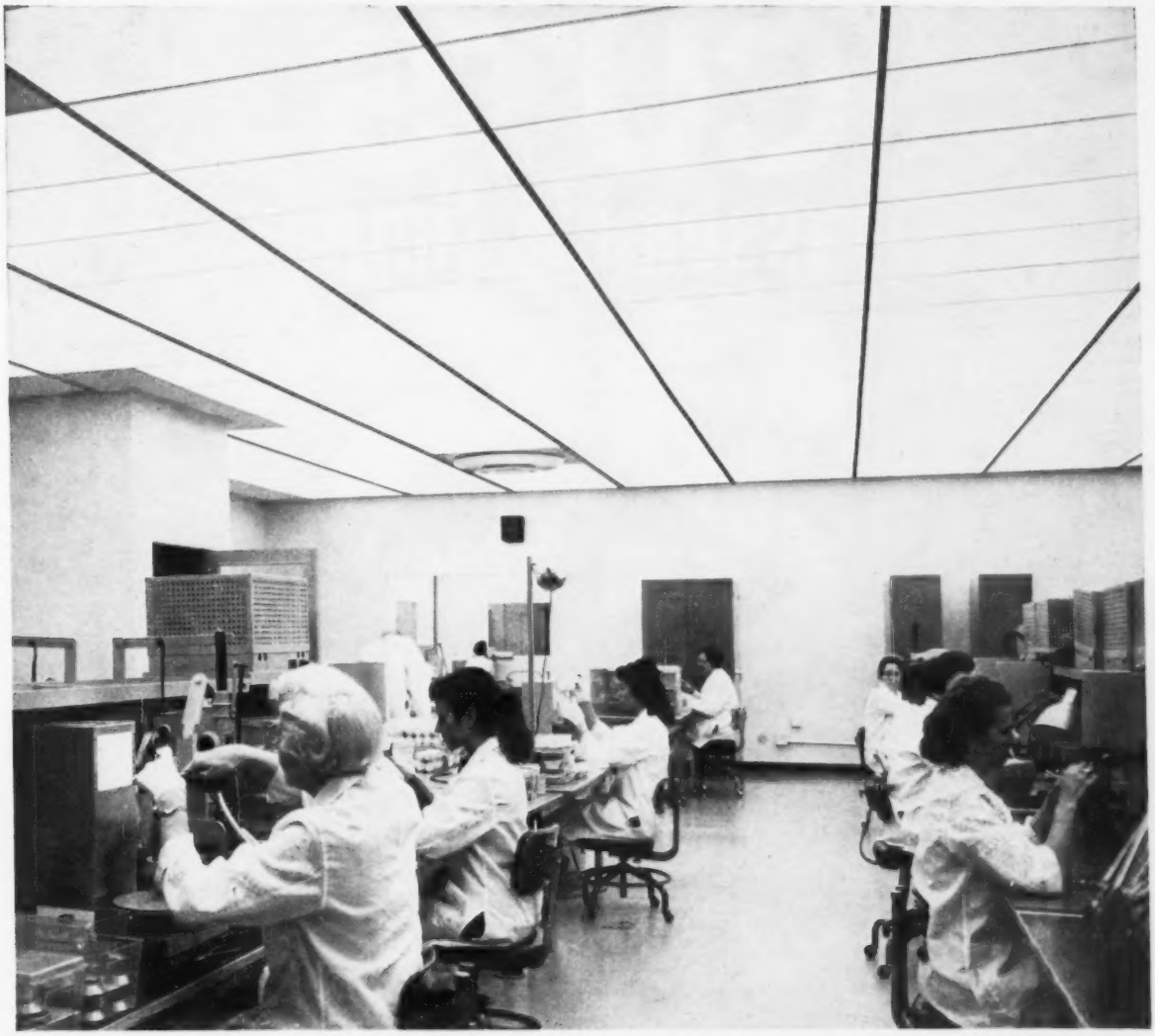
Revised standards for meter installation equipment prepared by the Pacific Utilities Electric Service Requirements Coordinating Committee, numbering some 22 pages, have just been issued to supersede previous standards concurred in by serving agencies both private and public, from Alaska to Arizona and Hawaii to Nevada, excepting northern California, Oregon and Washington.

Lighting Course

IES Sections and Chapters in Sacramento, Oakland, San Francisco and San Jose start a new lighting course for new people in the industry. It will be a seven-week course, starting April 4 on successive nights in each of the mentioned cities. It will begin with simple calculations and cover all light sources, control, fixture design, maintenance, economics, wiring, air conditioning integration, etc. Respective chairmen to contact are George Smedberg, Les Van Nostrand, Adi Bana.

Both plastic and aluminum conduit got a working over at the Arizona Chapter IAEI Jan. 9 meeting in Phoenix attended by new SW. Section President Ernest Nelson from San Leandro, Calif. Richard Gates of Rome Cable-Alcoa spoke on both plastic and aluminum and Kaiser's demonstration truck was present to illustrate by trying. Discussion from questions lasted into the afternoon when gas station vent pipe problems dominated code discussion.

THEY BROUGHT THE SKY INSIDE



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What's more, with the coupling *flush* to the conduit's outside wall, new CA is easy to stack, store and handle. The flush coupling also eliminates "staggered" joints in the trench. And that means real savings in cutting and tooling time.

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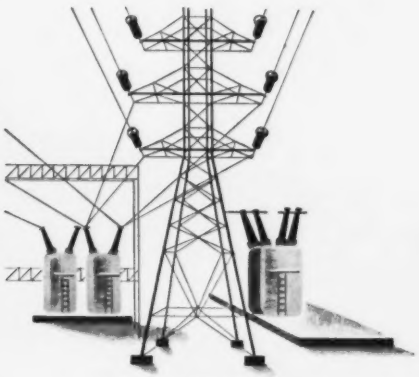

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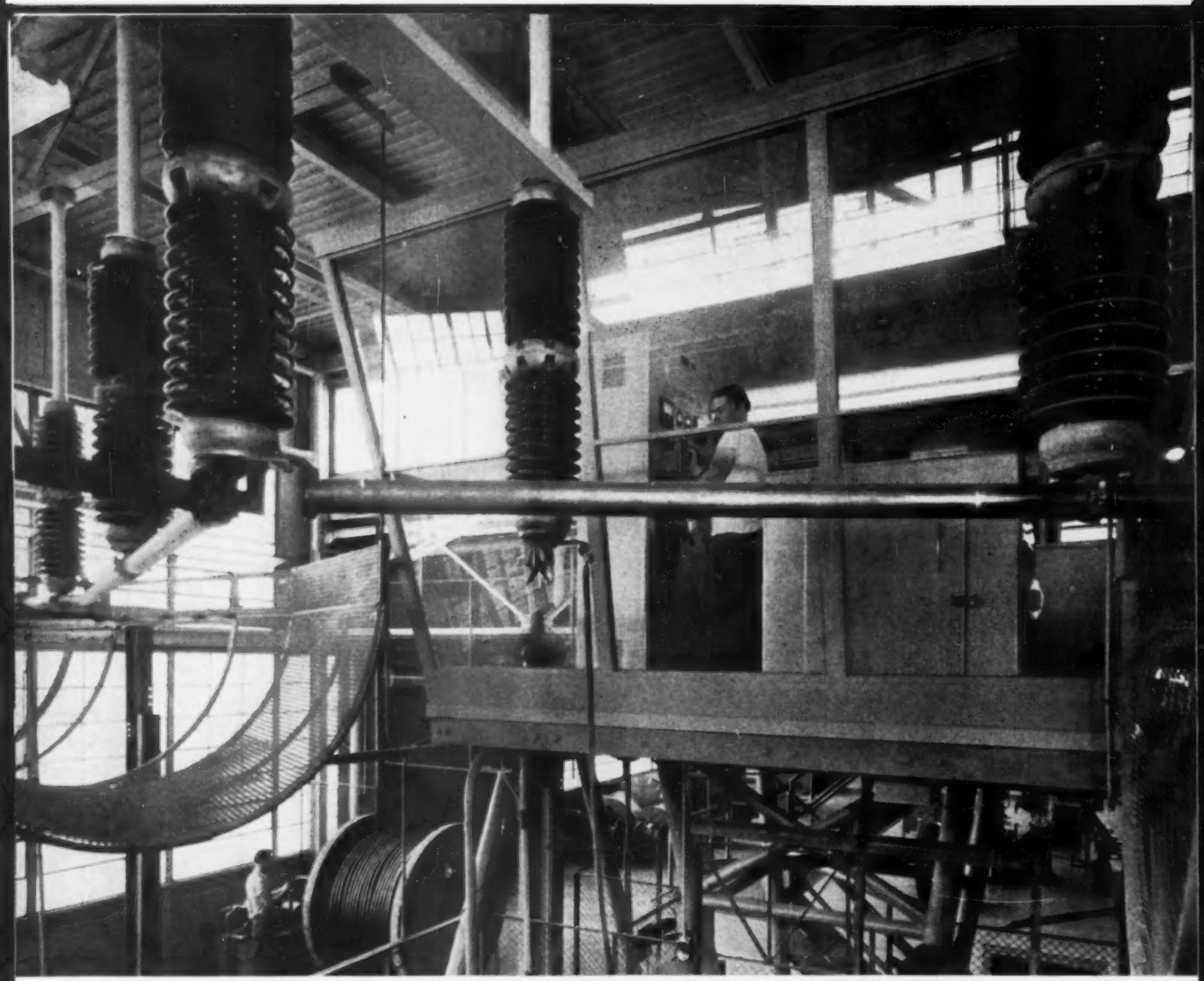

Shown here is a section of final testing area. Voltage tests are being applied to *full reel lengths* of cable before shipment.

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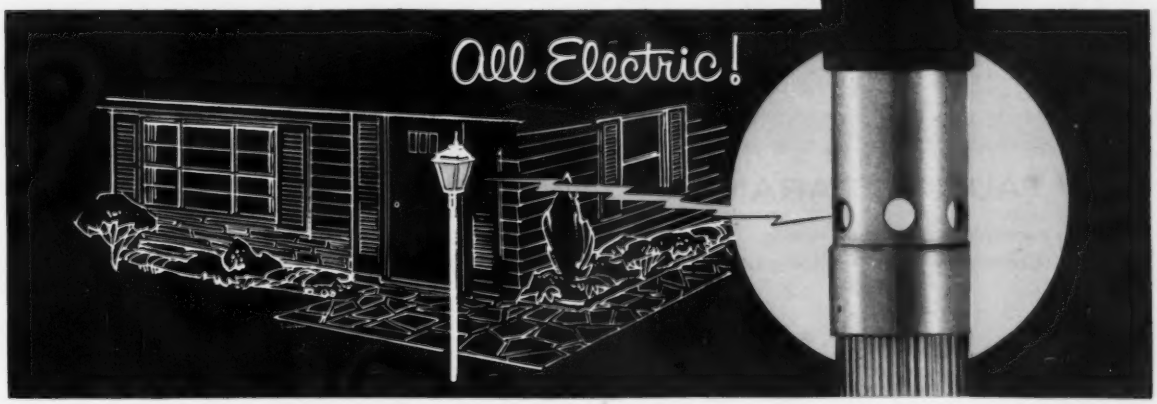

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HOW SOUTHERN STATES' BV-33-F CUTOUT CLEARS RESTRICTED OR HIGH FAULTS WITH EQUAL DEPENDABILITY

The complexities of today's distribution systems present a real challenge to the designers of cutouts. Industry requirements call for interrupting capacities up to three times higher than a few years ago. And yet the cutout must clear restricted faults with equal ease and sureness.

Large bore tubes, vented freely at both ends, will clear extremely high faults easily. Small bore tubes, vented at one end, will clear low faults easily. The big problem is to do both.

The Southern States BV-33-F Heavy Duty Cutout clears the complete range of fault currents with equal dependability—without damage to the cutout.

What About Single-Venting?

In single vented cutouts, the rocket effect of the tube, as gases are ejected, must be considered. Some type of shock absorber to cushion the fuse holder, as it tends to thrust upward, must be provided. But so far no practical recoil mechanism has been devised that can fully absorb the violent recoil action. Thus a substantial amount of shock is transmitted to the mounting, insulator, bracket, and cross arm.

As interrupting capacities on single-vented cutouts are increased, bore diameters become critical. If it is large enough to handle high faults, it may provide only borderline protection on restricted faults. Resorting to some extraneous means, such as special types of fuse links, is a dangerous concession to security—as there is no assurance of proper fusing in the field.

What About Controlled Venting?

Providing a small vent hole in the top hardware to permit a limited amount of gas to escape is not the solution either. This practice was dropped by Southern States long ago, when it was found that the hole became enlarged after each operation, endangering proper clearance of low faults.

Here's the Answer

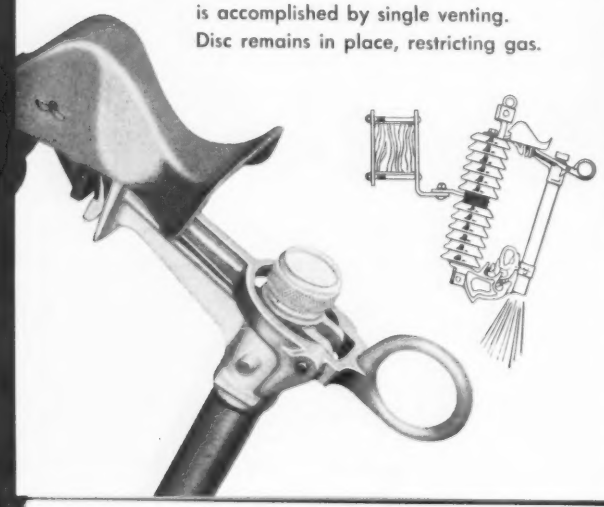
The BV-33-F offers all of the advantages and none of the disadvantages of single-venting or controlled-venting. This is accomplished with an economical expendable cap which confines gases on restricted faults, but allows them to double vent on high faults. Forces inside the tube are equal and opposite. Stress on the mounting is virtually eliminated. The cutout can operate time and time again without loss of efficiency. There is no built-in battering ram—no intricate mechanism, or springs to worry about. And any standard EEI-NEMA fuse link will provide positive operation every time.

Utilities throughout the nation are finding the BV-33-F a practical, workable solution to cutout problems.

Get complete information from your Southern States representative, or write for Bulletin 580C.

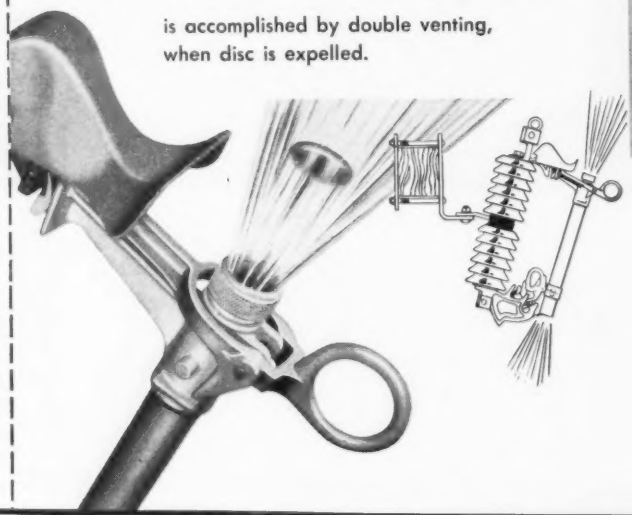
LOW FAULT CLEARANCE

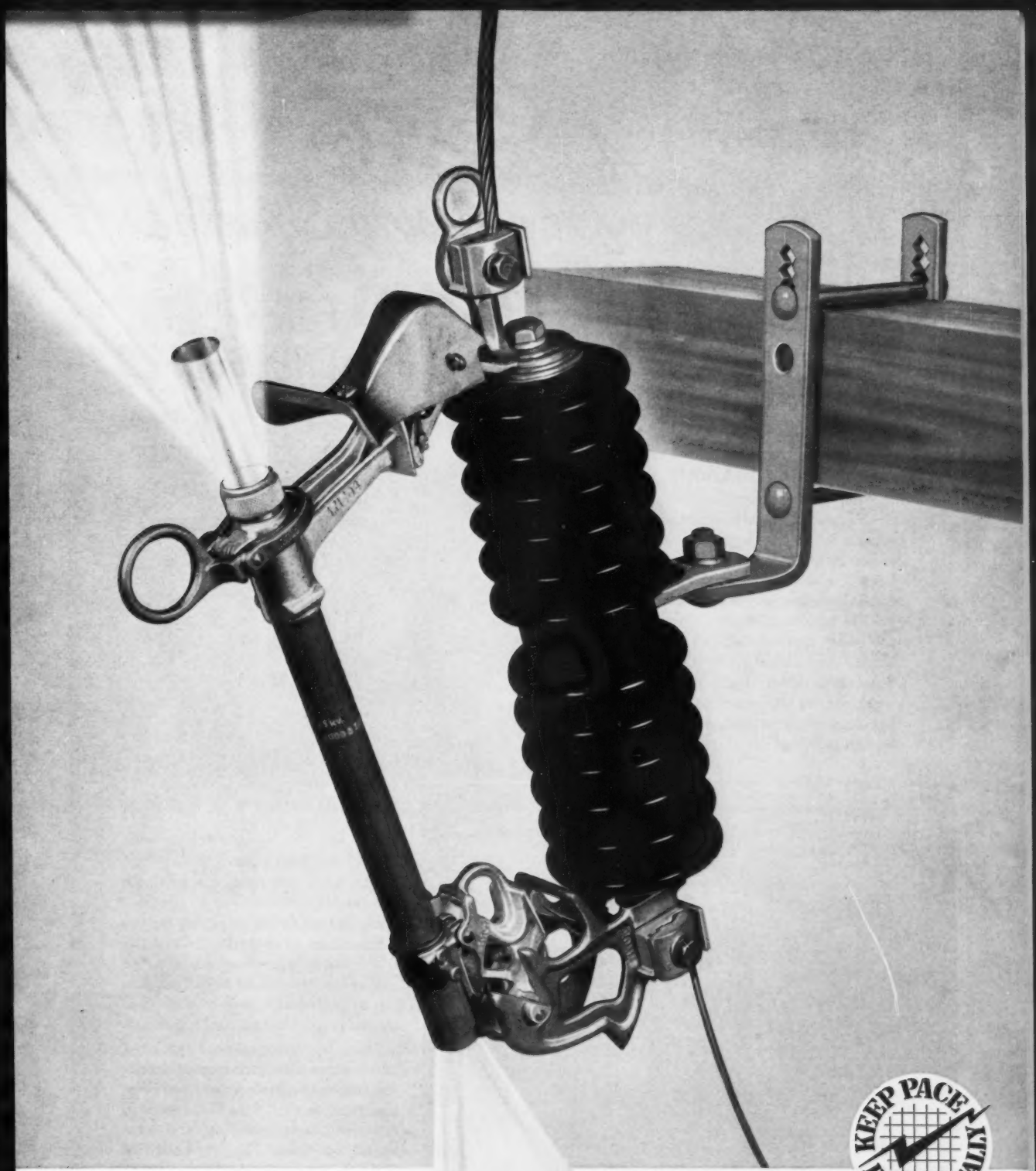
is accomplished by single venting.
Disc remains in place, restricting gas.



HIGH FAULT CLEARANCE

is accomplished by double venting,
when disc is expelled.





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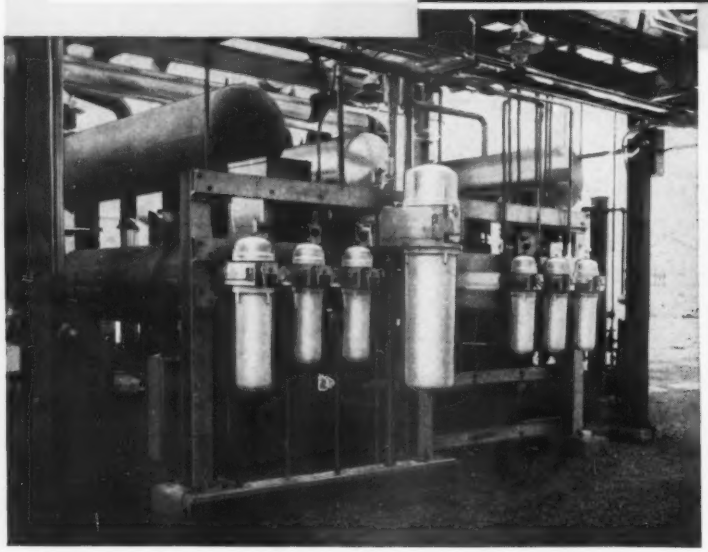

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Write for details. *Square D Company, 4335 Valley Boulevard, Los Angeles 32, California*

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Management

Colorado Proposal Revised

The Arizona Power Authority has filed a revised proposal with the FPC for development of the Colorado River in Mohave and Coconino Counties, Ariz. The present proposal calls for three dams with initial capacity of 820,000 kw and provides for future addition of 650,000 kw—all costing $347 million. The former proposal calls for a two-dam scheme, with an initial installation of 780,000 kw, an estimated cost of $289 million.

APA is pushing for a mid-February hearing.

The city of Los Angeles, on the other hand, is pressing for action to be delayed until March or April at the earliest. At the same time Water & Power officials are talking about a "financing proposal unique in the history of American dams . . . whereby funds to build the dam and power plant would be paid in advance to the federal government by power users in Arizona, California and Nevada."

► The Upper Colorado Basin Preference Users Committee has declared "a federal grid will best meet the requirements" of the Colorado River Project Act. The preference group's position is in direct opposition to the recent proposal by private utilities (ELECTRICAL WEST, December 1959, p 59). Two resolutions making this position clear were made public by Howard E. Scott, committee chairman, following a recent meeting in Denver.

Confirmed

Unanimous confirmation by the Seattle city council of the reappointment of Paul Raver as City Light superintendent appears to have eliminated operation of the municipal utility as a campaign issue in next spring's municipal election.

Mayor Gordon S. Clinton, in reappointing Raver to a four-year term, made it clear that he is supporting City Light on a number of issues that have drawn criticism from a Municipal League committee.

There had been speculation that Clinton, prominently mentioned as a Republican candidate for governor, would not renominate Raver, originally appointed by Clinton's Democratic predecessor.

Ruling Upheld

The Washington State Supreme Court upheld a ruling by a lower court that the Thurston County PUD cannot legally levy a tax to raise $100,000 for legal costs and preliminary engineering as first steps in biting off a $20 million chunk of Puget Sound Power & Light properties within the county. The point of law involved has to do with the procedure of giving public notice prior to adopting an annual budget and does not concern the PUD's ability to take over Puget Sound's properties. Net result is that the PUD will not be in the power business for at least one more year.

Protest Increase

In an interesting maneuver, the Pierce County Cooperative Power Assn., a group of seven small mutual companies, have protested Tacoma City Light's recent rate increase—the first in 20 years. The association has intimated that it might abandon buying wholesale power from City Light in favor of doing business with BPA or Puget Sound.

► A group of six Montana counties has proposed a reappraisal of private utility tax valuations. The proposal followed action last spring by the Montana State Board of Equalization in reducing tax valuations on utilities.

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If and When

The Yakima Pomona district grange has requested that the Yakima County PUD board of commissioners establish a two-mill levy in the district to provide funds for acquiring private power facilities if and when the board changes its position favoring distribution of electric energy in its area by private utilities. The Yakima County PUD is a so-called "inactive" PUD in that it does not generate, transmit or distribute any power. No action was taken.

► **A historic power line**—the first to serve power to the Coeur d'Alene mining districts in northern Idaho—is being removed by Washington Water Power crews. The line was completed in 1903 and operated initially at 45,000 v. It was the second line in the world to operate at this high a voltage.

► **A $2,400,000 damage suit**, brought against the city of Seattle by Merritt-Chapman & Scott Corp., has been dismissed by Federal Judge John F. Bowen. The alleged damages grew out of difficulties that were encountered in creating an effective ice curtain plus an additional $6,900,000 for extras and changes. It is expected that the court's decision will be appealed.

► **Reorganization of Hawaii's government** under the new state constitution will place its Public Utilities Commission under the Department of the Treasury. Officials of the PUC see little practical change in its operation. The five commissioners, appointed by the state governor, will continue to set policy.

► Portland General Electric will again give two college scholarships to top winners in its annual "Electricity at Work" contest among Oregon high school students. Entries will be received from 66 high schools in PGE's service area.

► The 5½-month Glen Canyon Dam strike has been settled. Settlement was on the basis of 50¢ an hour above wage rates elsewhere in

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Arizona. Unions had previously demanded $6 a day subsistence on the basis that Page, Ariz., the project headquarters, was a remote area.

► With plans going ahead for construction on the Cowlitz, Tacoma City's clerk has **refused to accept petitions for amendment to the city charter, which would block construction on the Cowlitz.** The city attorney has ruled that petitions were in improper form and that the subject matter was improper for a charter amendment, conflicting with state laws. Construction on the Cowlitz has been hampered for years by so-called fish interests and it is felt that the petitioners may seek legal counsel in hope of obtaining a writ of mandate from the superior court.

Financial Notes

Southern California Edison Co. has filed a registration statement with the Securities and Exchange Commission covering the proposed sale of $30 million of first and refunding mortgage bonds.

Washington Water Power Co. has filed a statement with the Securities and Exchange Commission outlining a proposed $15 million bond and debenture offering. The firm seeks registration of $10 million in first mortgage bonds, due in 1990, and $5 million in sinking fund debentures, due in 1985.

The Wyoming PSC has authorized **Teton Valley Power & Milling Co.** to sell its Wyoming electric utility property to Fall River Rural Electric Cooperative Inc. The $537,000 sale also involves property in Idaho.

The Wyoming PSC has authorized **Cheyenne Light Fuel & Power Co.** to issue 24,000 shares of common stock to its parent company, Public Service Co. of Colorado. Proceeds from the sale will be used to retire $600,000 of short term notes payable to the parent firm.

California-Pacific Utilities Co. has produced a net income of $1,055,000, equal to $2.67 a share for the common stock, from revenues totaling $11,159,000 for the period of 12 months ending Oct. 31, 1959. During the preceding year earnings amounted to $2.28 per share. Company plans for a two-for-one split of the common stock were initiated by the board of directors subject to approval by the shareholders and regulatory bodies.

Growth

Look at Dam Proposals

Proposals for developing two of the world's greatest hydroelectric potentials are being closely scrutinized as a result of current negotiations on the Columbia and Peace Rivers. With recommendation by International Joint Commission that downstream benefits of the 1,225-mile Columbia be shared on a fifty-fifty basis by United States and Canada, this vital issue, a contentious international one for 15 years, became reactivated.

And in Victoria this week, actions of Premier Bennett indicated the B. C. government would approve, early in 1960, the application of Wenner-Gren interests to develop the hydro resources of the 1,600-mile Peace River.

The basic IJC draft of principles, expected to be presented soon to the two central governments, will form the framework of a joint power construction pact, which will probably be negotiated in the first quarter of 1960.

The agreement (a major concession for Canada) clears the biggest international hurdle to harnessing 3,000,000 kw at Mica Creek and generation of another 2,000,000 kw in the United States (when all sites on lower Columbia completed) of which about 1,000,000 kw could be returned to B. C. as down stream benefits.

While the IJC action clears the way for harnessing the Columbia, it has cast quite a shadow of speculation over the outcome of the Peace River Power Development Co.'s decision (announced only a few days before that of IJC) to proceed with its $630 million scheme to develop about 3 million kw on the Peace River, which flows across the northern section of the province into Alberta. Earlier this month board of directors of PRPD (a subsidiary Wenner-Gren company formed explicitly to expedite the hydro aspects of the over-all Wenner-Gren industrial plan for northern B. C.) approved the plan to build a colossal dam near Hudson Hope.

PRPD President W. C. Mainwaring reported to McGraw-Hill that the IJC draft did not make any difference to PRPD's plan. It was going ahead.

Premier Bennett said that the Columbia decision had not altered the favorable attitude of his government towards the Peace plan.

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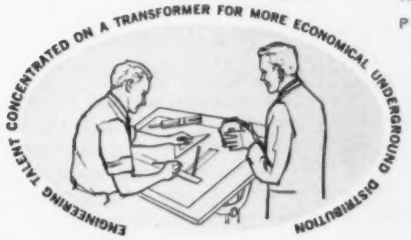

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Both he and Mainwaring insist B. C. will need both Columbia and Peace power, to be developed in an integrated way.

"My attitude, and that of the B.C. government has always been that we need both to attract industry and create new employment," Bennett said. "I would remind those who revive the old cry of 'what are we going to do with all that power,' that throughout the history of hydro development in North America, the same questions have always been raised and it is always followed a few years later with cries for even more power."

► Eugene Water & Electric Board has accepted recommendation of Bechtel Corp. to increase the generating capacity of the proposed Carmen-Smith project from 56,000 kw to 90,000 kw. On its present schedule bids will be invited in May 1960. Total project cost, about $26 million.

► Southern California Edison Co. has ordered a Minneapolis-Honeywell transistorized computing system that will prepare and process all billing and accounting for the company's one million customers. The new equipment will be installed in the new offices in Long Beach.

► After more than two years of negotiations, the Everett, Wash., city commission and the Snohomish County PUD have agreed on a $45 million joint construction program to develop the water and the hydroelectric resources on the Sultan River. The project calls for construction of three dams, three power houses and associated tunnels, conduits and transmission lines. It will develop 100,000 acre-ft of water storage and have an installed electric capacity of 150,000 kw. The first phase of construction is planned for 1962.

► Chelan County PUD has awarded a contract for the review of a proposed hydroelectric development at Drury Creek in Tumwater Canyon. The proposed project would produce 185,000 kw during the spring months and about 35,000 kw during the rest of the year. The spring peak would be advantageous to the PUD offsetting the loss of head on its Columbia dams during flood periods.

► Consumers Power Inc., Corvallis, Ore., was given a $517,000 REA loan to be used to finance the construction of 102 miles of distribution line to serve 285 new rural consumers and to complete previously authorized system improvements.

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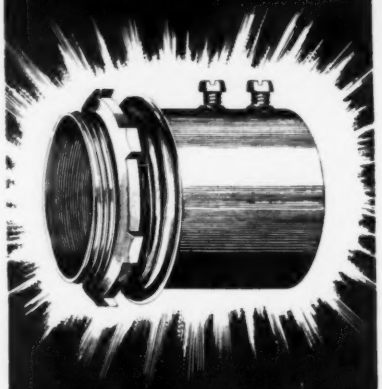

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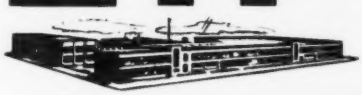

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Nuclear News

The Atomic Energy Commission has selected, as the basis for contract negotiations, a proposal by the Fluor Corp. for the performance of architect engineering services for an experimental organic-cooled reactor. Atomics International will assist Fluor as subcontractor in design of the nuclear portion of the facility.

The organic-cooled reactor development program includes the development of new fuel elements, new coolant materials and improved core design. The development is aimed at building a scientific base for possible power reactors.

The California PUC has granted a certificate of convenience to PG and E for construction of its Humboldt Bay atomic power plant. While the PUC ruling is a significant one, PG and E must receive AEC okay and permission from local authorities before actual construction can begin.

The AEC is receiving proposals for design, construction and operation of two 50,000-ekw power plants. One of the plants will be an advanced boiling water design and the other an organic-cooled and moderated reactor. The commission expects to support research and development for the project and will waive fuel charges during the first five years of operation.

There is great enthusiasm among city of Pasadena and city of Los Angeles officials who made a joint proposal, regarding the possibility of their being selected to build one of the 50,000-kw stations.

An atomic industrial forum group, which has been examining AEC costs for producing enriched uranium, has revealed that AEC prices for enriched uranium represent actual government cost and that sufficient capacity for producing this fuel is available.

Since enriched uranium fuel is used in most United States nuclear reactor designs, this announcement was of particular interest.

Most importantly the forum study gives a measure of assurance that the portion of nuclear power costs dependent upon the AEC-controlled price for enriched uranium is reasonable and will not be subject to wide fluctuation.

It is most reassuring to know that ample capacity for enriching uranium is available to support a large nuclear industry.

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It isn't every day that you find a group of people doing a good job not only because they're paid to—but because they *want* to. We're blessed with such a group at Fisher-Pierce, and the way they assemble, inspect and test F-P photoelectric streetlight controls makes you think that they personally and individually guarantee every one. In a sense, of course, they do. And while this might seem like too much fussyness to some people, the line foremen would a lot rather see it this way than their not being fussy enough.

So all this makes life easier for Fisher-Pierce, you may say, but what difference does it make to me? For one thing, it greatly raises the odds of the controls passing your incoming inspection. (Before our inspectors let them go, the controls have not only come under several sets of practiced eyes, but have been "run in" on cycling tests that are equivalent to a couple of months of turn-on and turn-off.) And there are also some proven manufacturing processes that go hand-in-hand with this "quality-consciousness": use of heat sinks to protect the CdS cells while the leads are soldered; 100% hi-pot testing; pressurized-solvent cleaning of relay contacts after hi-pot testing. As much as possible, one person is responsible for a group of related assembly operations, instead of just tightening one nut all day long.

The net result of this "esprit de corps", in our opinion, is a better control for your money. When the builders pay attention to their jobs—whether the foreman is looking over their shoulder or not—they're working for your benefit as much as ours. The Fisher-Pierce Co., 43 Pearl St., So. Braintree 85, Mass.

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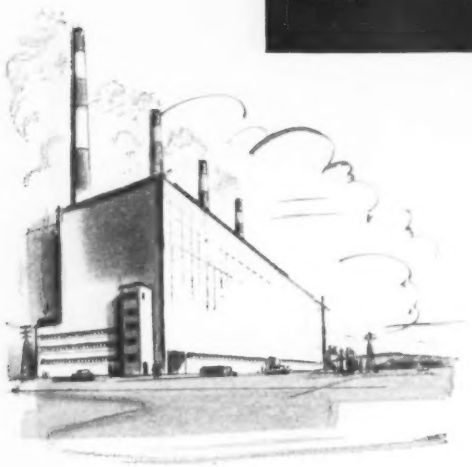

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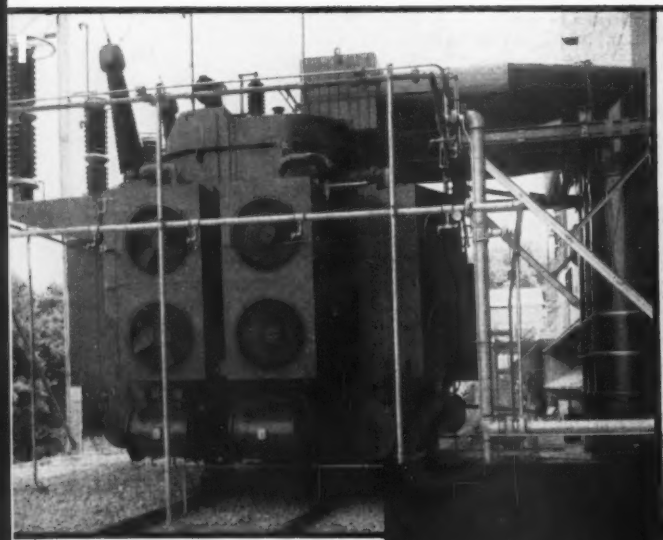

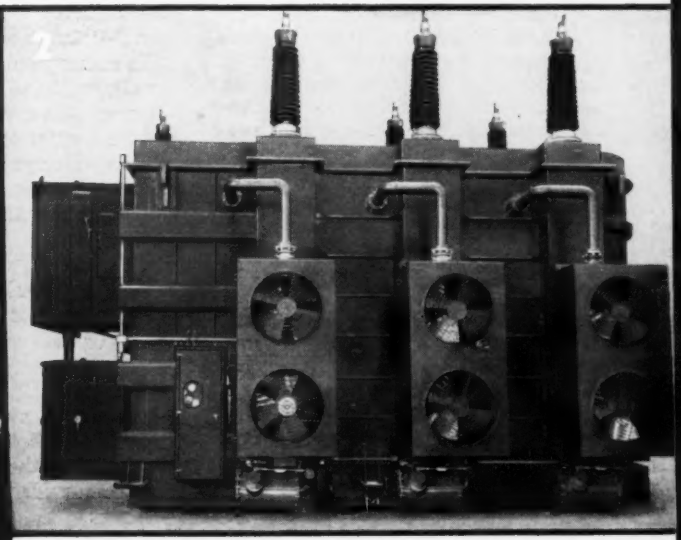

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3 *135,000 KVA, Class FOA, 13.8—115 KV*
New Orleans Public Service, Inc.

4 *125,000 KVA, Class FOA, 13.8—138 KV, LTC*
Union Electric Company

5 *100,000 KVA, Class FOA, 14.4—161 KV, LTC*
Iowa Power and Light Company

6 *20,000 26,667 KVA, Class OA FA, 132—12.6 KV, LTC*
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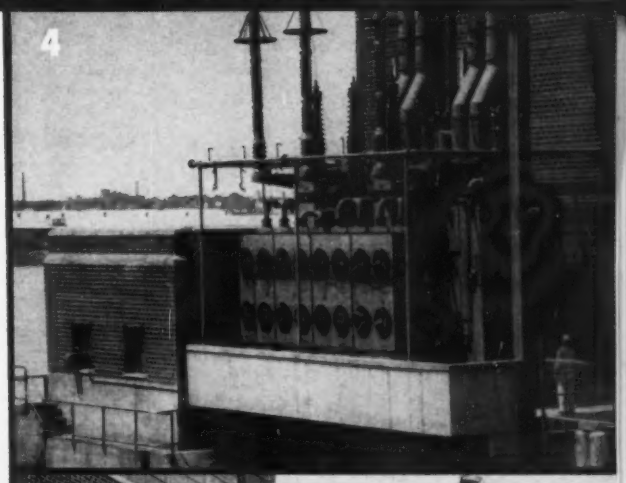

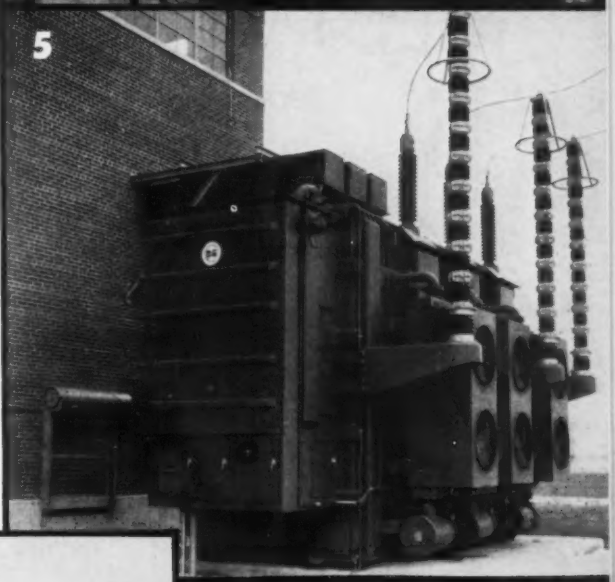

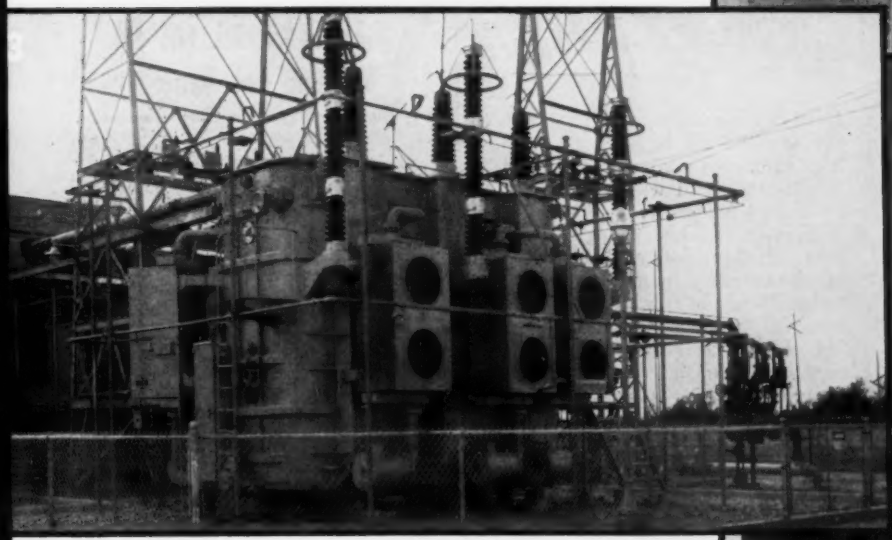

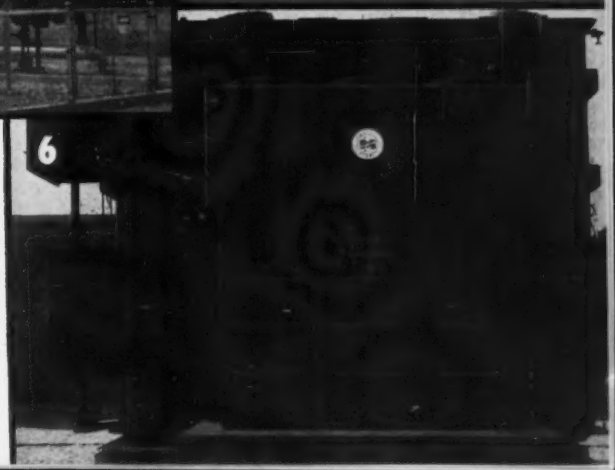

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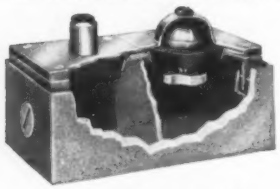

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Communications

Standard Low Frequency Broadcasts are being made during each working day from National Bureau of Standards station KK2XEI at Boulder, Colo. Station power is 40 w and frequency is 60 kc, accurate to one part in 10^8 with stability about two parts in 10^{10}. In spite of low power, the station can be picked up in most Western areas where there is room for an antenna and low interference. Write NBS Boulder Laboratories, Division 84.20, Boulder, Colo., for more complete information.

Radio Towers should now sport same width bands of International Orange and White. If yours doesn't, better be prepared to do something about it. These new painting regulations became effective on the first of the year. This applies to existing radio towers as well as to new installations.

Kentucky PUC has approved Bell System railroad interconnection tariff application. The commission took the stand that tariff did not discriminate against other users who are not granted interconnection privileges. Exactly opposite view was taken by PUC of North Carolina in turning down similar application a short time ago. The score is now two approvals and one disapproval from state PUCs.

Data Transmission at 105,000 bits per second will be used on a one-hop microwave system linking the Weather Bureau with the National Bureau of Standards in Washington. The system is now under development in Motorola's Lab and will use seven wide band channels for transmission of the magnetic taped information between the two IBM 704 computers. Previous to this the tapes were hand carried between the two locations in order to help the Weather Bureau over its forecasting peaks. This concept of linking very expensive pieces of equipment together to obtain a better load factor will undoubtedly receive more attention in the future.

John R. Binns recently passed away at age 75. Really old-time communications men may recall that he was the first maritime wireless operator to tap out a "CQD" in 1909 and guide rescuers to his damaged ship. Contrast that first lonely message with today's clutter and try to imagine 50 years from now.

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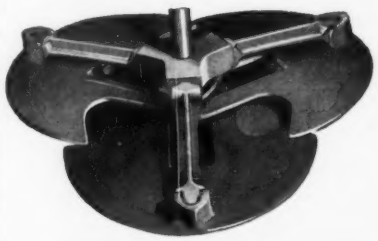

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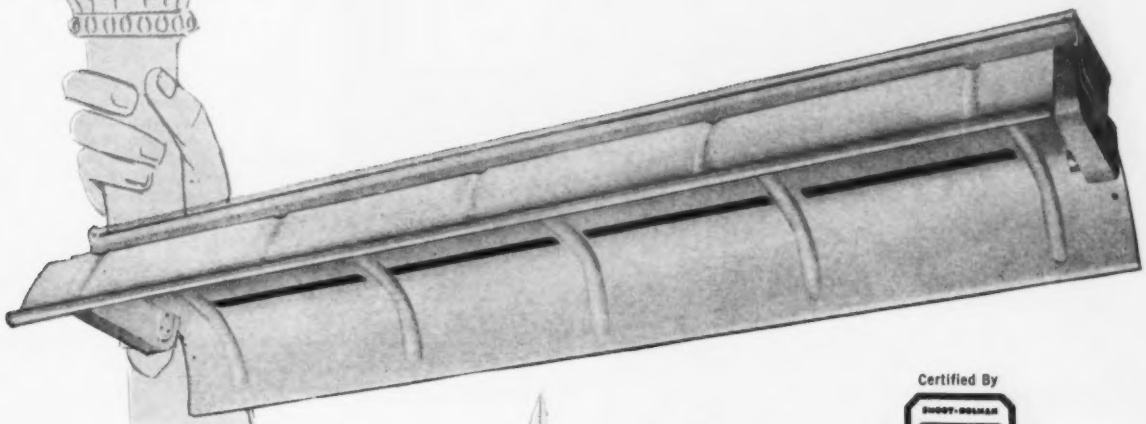
NEW SMOOT-HOLMAN

MARK V INDUSTRO-LUX



Certified By

RLM

Far Exceeds Requirements

1960 design backed by 40 years of industrial lighting fixture experience.

*Best looking industrial fluorescent fixture available today!

*Five die-formed ribs provide maximum rigidity, straight rows!

*New reflector aligner clips prevent light leaks between fixtures in continuous runs!

*Proper light distribution. Computer designed!

Why settle for less when the best costs no more?

Write for Complete Specifications and Performance Data.

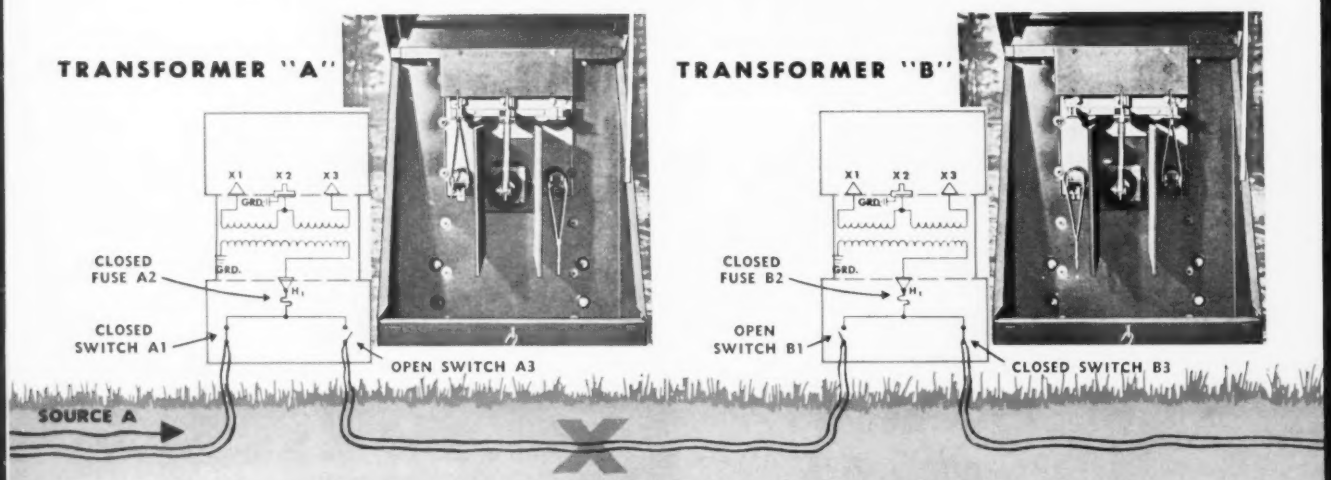
SMOOT-HOLMAN COMPANY • INGLEWOOD, CALIFORNIA

For phone number of closest representative see advertising index in back of book.

ANNOUNCING.

MINI

Shown at left is the first of 21 Central MINI-SUB transformer units now being installed to provide electric service to one of Little Rock, Arkansas' newest residential sub-divisions. Installation is under the direction of Lyle Hayden (left), Division Engineer, and John Lee (right), Division Superintendent for Arkansas Power & Light Co.



The schematic drawings above represent part of an underground system employing Central MINI-SUB units and show various switching combinations for de-energizing cable sections and/or transformers. For example, should maintenance work be required at Point X on the underground cable, the entire cable section between MINI-SUB A and MINI-SUB B could be de-energized by opening Switches A3 and B1. Power Source A would continue to serve Transformer A and Power Source B would continue to provide service for all other MINI-SUBS in the system. To de-energize a single transformer, without interrupting power flow, each MINI-SUB is provided with a disconnect fuse which can be easily and safely opened (see Fuse C). Each primary compartment of the MINI-SUB features two blade type disconnects for isolating the high voltage source on both sides of the unit. These S&C Electric Co. Disconnects are designed to interrupt full load current up to 200 amperes with no external arc when opened with a Loadbuster tool. These Disconnects function externally to the transformer, thus eliminating arc contamination of the transformer oil. They also provide a visible air gap when open.

CENTRAL

..CENTRAL'S *Revolutionary* NEW

-SUB Transformer

MORE THAN A TRANSFORMER! In Fact, a Miniature Substation Designed For Use in Residential Underground Systems

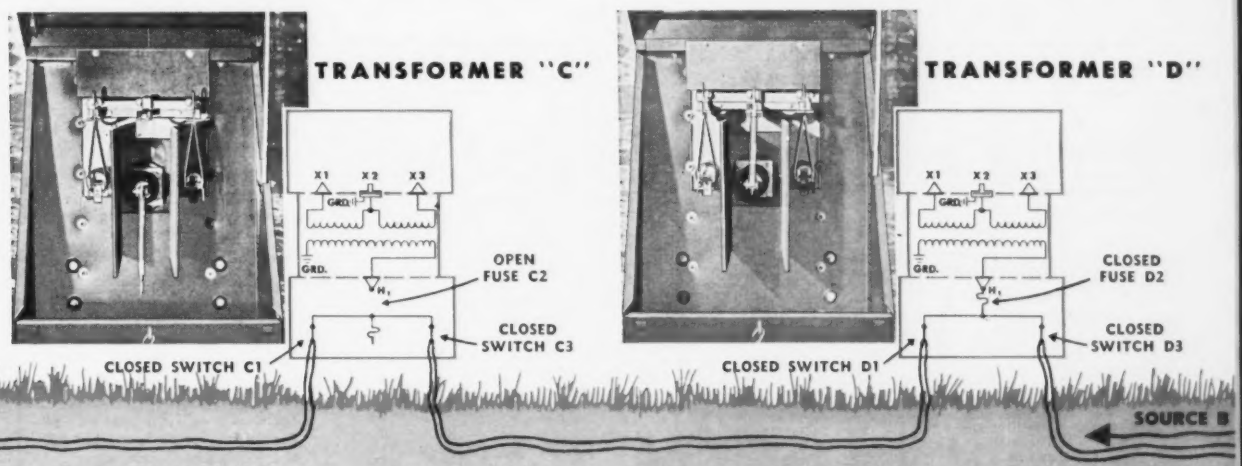
Central's MINI-SUB transformer unit is designed especially for safe, efficient, economical operation in modern underground distribution systems.

The high and low voltage terminals are housed in separate compartments bolted to the sealed type transformer. The high voltage compartment may be installed separately to permit early completion of the high voltage loop and establishment of sectionalizing switch points.

The transformer and secondary compartment may be installed subsequently, depending upon load requirements.

As load requirements increase, larger KVA transformers may be installed with minimum time and effort and without disturbing primary cable connections.

Central's miniature substation provides safe, convenient, and visible switching facilities and fuse protection. It is designed to fulfill long range requirements of modern underground Distribution service. It is presently available in sizes 25 through 167 KVA, without taps, in voltages 13,860GrdY, 13,200GrdY, and 12,470GrdY to 240/120 volts.



A newly designed S&C distribution class boric acid disconnecting fuse rated 50 amperes continuous, 5000 ampere maximum interrupting and suitable for operation in a metal enclosure, provides fault protection. Its exhaust gases are non-conductive and are confined within the enclosure. An important feature of the new fuse is that its rating and time current curves are such that it can see and remove not only internal faults but a majority of faults in the secondary system. Because of its location in the circuit, it can also detect faults in the primary bushing. The disconnecting fuse may be opened under load conditions when used with the Loadbuster tool disconnecting the transformer from the source. The epoxy glass fuse may be replaced without untanking the transformer.

The low voltage compartment of the MINI-SUB provides easy access to secondary terminals to facilitate installation of low voltage cables and to guarantee ease of service and safety of operation. Adequate space is provided for secondary fuses if desired and for making up cable connections serving 8 to 12 houses.

CTC

Sales Offices in Principal Cities

Transformer Corporation

Telephone JEfferson 4-5332

PINE BLUFF, ARKANSAS

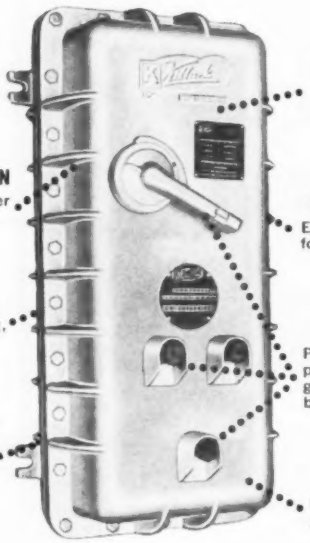
Plants at Pine Bluff, Arkansas and Arcadia, Florida

NEMA

Killark control enclosures are best... BECAUSE THEY WERE DESIGNED IN THE FIELD

The Result of Field Tests . . . Plant Surveys . . . Consultation with Electricians, Electrical Engineers, Contractors

EXAMPLE:
An explosion-proof combination starter:



ALL-ALUMINUM
Lightweight, non-corrosible. Efficient thermal conductivity, non-magnetic.

RIBBED CONSTRUCTION
Maximum strength, faster heat dissipation.

RECTANGULAR SHAPE
Easier installation, better fit for components.

SPLIT-BOX DESIGN
Simpler wire pulling, easier accessibility.

FRONT OPERATION
Positive handle mechanism provides for 3 locks, safety guarded start-stop reset buttons.

GROUND SURFACES
Carefully machined for tighter fit. No stripped or galled threads.

HEAVY WALLS
Hubs of any size, located anywhere you want them.

ILLUSTRATED CATALOG SUPPLEMENT—State your interest.

• Circuit Breakers
• Motor Starters
• Panel Boards
• Disconnect Switches
Killark
ELECTRIC MANUFACTURING CO.
Vandeventer and Easton Aves. • St. Louis 13, Mo.
Sold Through Leading Distributors:
WAREHOUSE STOCKS in NINETEEN CITIES in U. S. and CANADA!

Meetings Calendar

FEBRUARY

11—*Intermountain Electrical Assn.*, Hotel Utah, Salt Lake City.

13—*Snake River Valley Electrical Assn.*, annual conference.

14-16—*Power & Communication Contractors Assn.*, 15th annual convention, Brown Palace, Denver.

23-26—*California Municipal Utilities Assn.*, 26th annual meeting, Miramar Hotel, Santa Monica.

25—*San Diego Bureau of Home Appliances*, spring conference, House of Hospitality, Balboa Park, San Diego.

29-March 1—*Pacific Coast Electrical Assn.*, Business Development Section, Hotel Lafayette, Long Beach.

MARCH

21-22—*Wood Pole Conference*, Oregon State College Campus, Corvallis, Ore.

23-25—*Electrical Maintenance Engineers Assn. of California*, Industry Lighting Conference and Show, Shrine Exposition Auditorium, Los Angeles.

31-April 1—*Pacific Coast Electrical Assn.*, Engineering and Operating Section conference, Hotel Claremont, Berkeley.

APRIL

6-8—*Northwest Public Power Assn.*, annual meeting, Eugene Hotel, Eugene, Ore.

7-9—*B. C. Electrical Inspectors Assn.*, annual conference, Astor Hotel, Burnaby, B. C.

11-12—*Pacific Coast Electrical Assn.*, Administrative Services, conference, Huntington-Sheraton Hotel, Pasadena.
—*International Association of Electrical Inspectors*, Utah chapter annual meeting.
—*IAEI*, Idaho Chapter annual meeting.

22-27—*San Diego Bureau of Home Appliances*, annual Spring Fair, Balboa Park.

24-26—*Rocky Mountain Electrical League*, spring conference, Harvest House, Boulder, Colo.

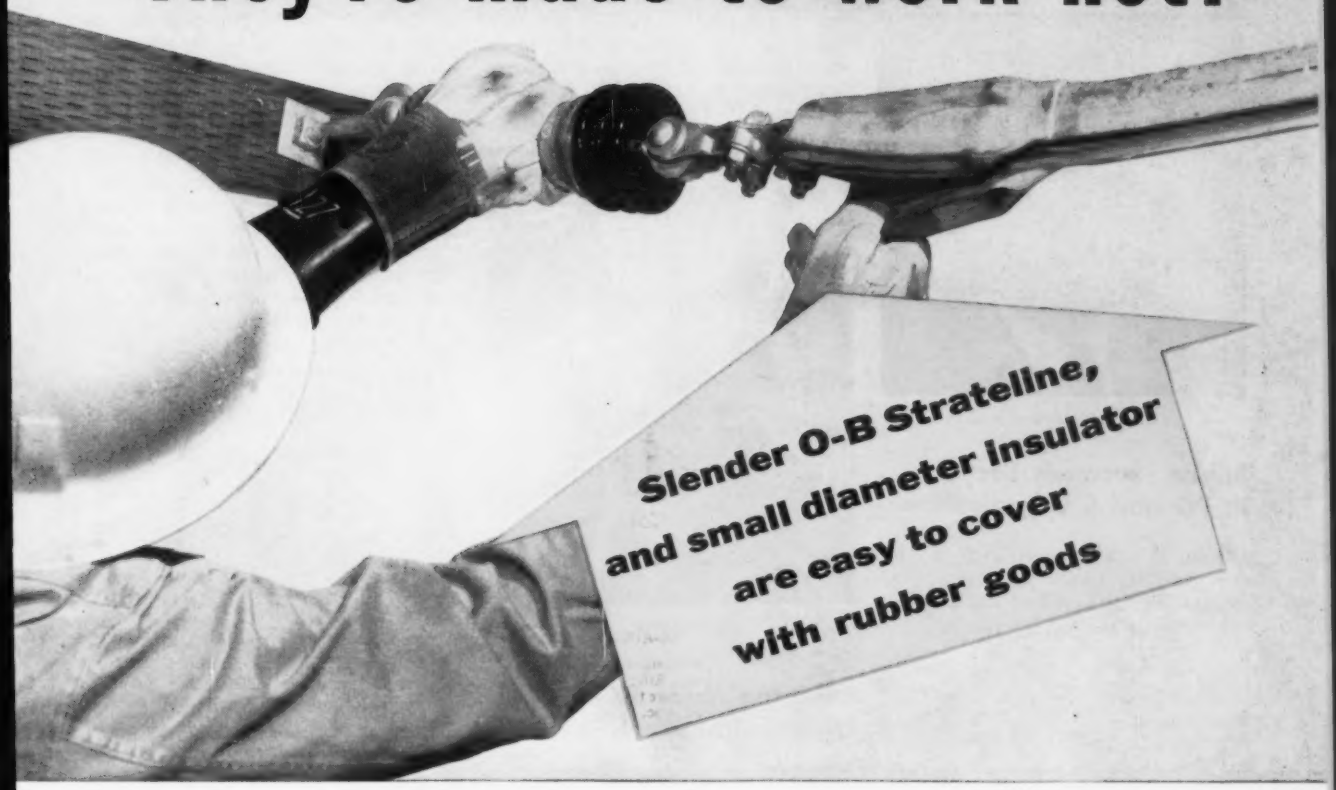
27-29—*Northwest Electric Light & Power Assn.*, Engineering and Operation Section, Personnel & Safety Section, Florence Hotel, Missoula, Mont.

27-30—*Western Air Conditioning, Heating, Ventilation & Refrigeration* Conference and Show, Shrine Exposition Auditorium, Los Angeles.

28-29—*Illuminating Engineering Society*, Intermountain Regional Conference, Hotel Westward Ho, Phoenix.

Plants at Pine Bluff, Arkansas and Arcadia, Florida

They're made to work hot!



For deadends that have to be worked hot, here's the ideal insulator-hardware combination:

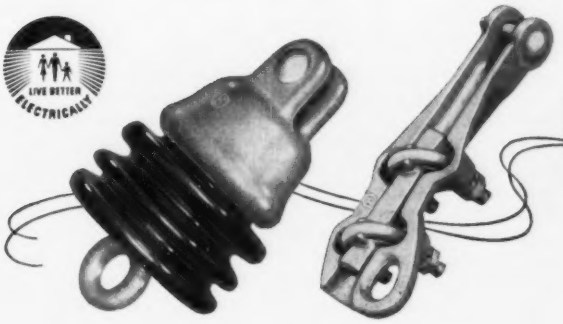
1 -- The O-B Strateline clamp
2 -- The O-B 4¼-inch diameter insulator

Before the present Strateline design was approved, it was submitted to two of the leading manufacturers of hot-line tools for testing in actual applications. Their verdict: "Ideal for hot line work." Their reasons: the captive keeper piece, the long U-bolts, the conveniently located loop, the rounded nuts.

Ideal companion for the ideal clamp is the 4¼-inch-diameter Catalog 42399 insulator. It carries the same 10,000-lb. M & E rating as a standard six-inch unit. Its smaller diameter reduces the amount of clearance needed for forming jumper loops.

If you're looking for extra convenience and speed in working deadends hot, we suggest you consider these two quality items. Your local Graybar man will be glad to discuss your needs with you and to cooperate in keeping a stock of both items in his warehouse.

OHIO BRASS COMPANY, MANSFIELD, OHIO
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.



LIVE BETTER ELECTRICALLY

GRAYBAR These products distributed by GRAYBAR ELECTRIC COMPANY

Ohio Brass

HOLAN

PORCELAIN INSULATORS • LINE HARDWARE • CAPACITORS • LIGHTNING ARRESTERS
BUSHINGS • HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES • BRONZE VALVES

4954-H

People

Bonner

Bonner Succeeds Dreyer In PG and E Organization

John F. Bonner has been elected vice-president in charge of engineering for Pacific Gas and Electric Co. He succeeds Walter Dreyer, who retires after 43 years with the company.

Bonner has been assistant to Dreyer since 1955. The son of Frank E. Bonner, consulting engineer who has specialized in hydro projects in the West, he was graduated from UC in 1937 and joined PG and E as assistant hydrographer.

During World War II he served as an anti-aircraft artillery officer. He took part in the Normandy invasion in France and rose to battalion commander, receiving several decorations. He is now a member of the Army Reserve, retired, with the rank of colonel.

Dreyer, who will continue with PG and E as a consultant, began with the company as a summer time employee while a student at UC. He was graduated in 1916 and became a designer in the company's civil engineering division. He served as a first lieutenant in the Air Service during World War I. Returning to the company he was in charge of design until 1929, when he became assistant chief of the civil engineering division. He was made chief in 1944 and vice-president and chief engineer in 1952.

► Salt Lake contractor-dealer **J. Vernon Sharp** of Sharp Electric Co. has been called to organize and direct the Andes Mission in Chile and Peru for the Church of Jesus Christ of Latter-day Saints, and his brother, **Legrande Sharp,** will manage the electrical business while he is thus serving. Sharp has always been a very active man in the electrical industry of the Salt Lake City region and has been chairman of the Illuminating Engineering Society, American Institute of Electrical Engineers, Intermountain Electrical Assn., Utah Society of Professional Engineers.

Robinson

Robinson Made Editor Of Electrical West

Jack D. Robinson, engineering editor since 1956, became editor of ELECTRICAL WEST on Jan. 1. C. W. Leihy, who had been publisher and editor, continues as publisher of ELECTRICAL WEST and its sister publication, WESTERN ARCHITECT AND ENGINEER.

Before joining McGraw-Hill of California, Robinson was with General Electric Co. on its student engineer program, in the transformer division and finally as sales engineer in San Francisco. He is a graduate of the University of California and served in the Navy during World War II.

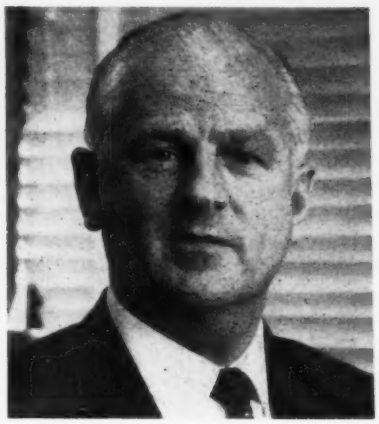
McKee Named First Citizen

Paul B. McKee, chairman of the board of Pacific Power & Light Co., was named First Citizen of Portland, an honor presented by the Portland Realty Board to citizens who have made outstanding contributions to the city's welfare. Presentation was made at a dinner in early February.

The Realtors cited McKee's 25 years of activity as a leader in service and civic organizations, his part as a founder of the Community Chest idea and his role in fostering a spirit of community participation and industrial leadership among his associates.

In 1953 McKee was named "Man of the Year" by the National Association of Manufacturers for his work on a Mutual Security Aid mission to Holland.

► **Edward G. Russell** has been named assistant electrical engineer of operations for Los Angeles Department of Water & Power to succeed A. C. Wingo who retired Dec. 1. **G. M. Babcock** was named engineer in charge of hydroelectric plants and **Oliver Jessen** moved into a position vacated by Babcock, who was statistical engineer for the operating division. New sales promotion manager is **James H. Waid,** a former manager of new construction sales.



Pritchett

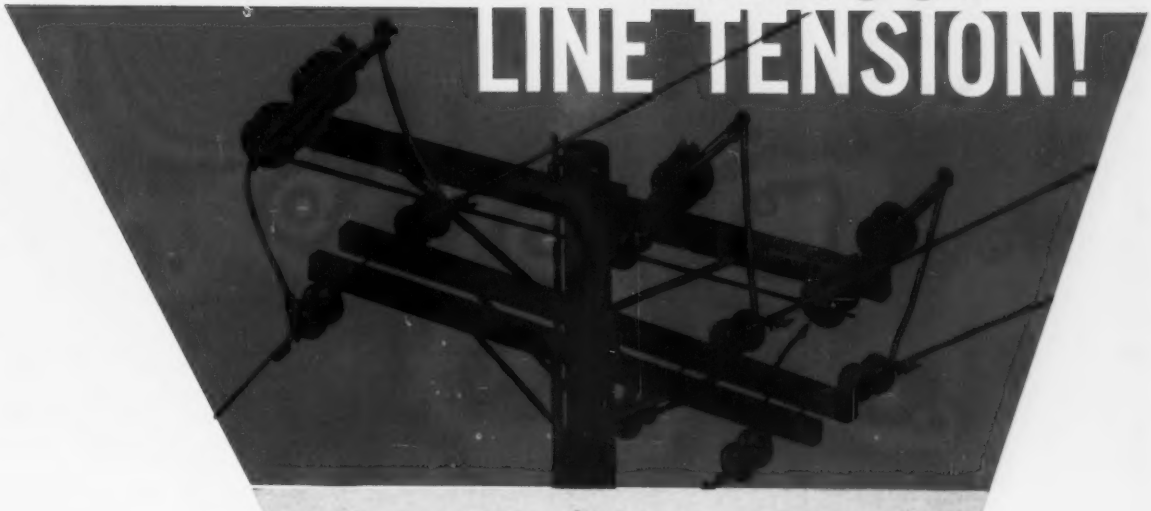
Pritchett Takes New Post

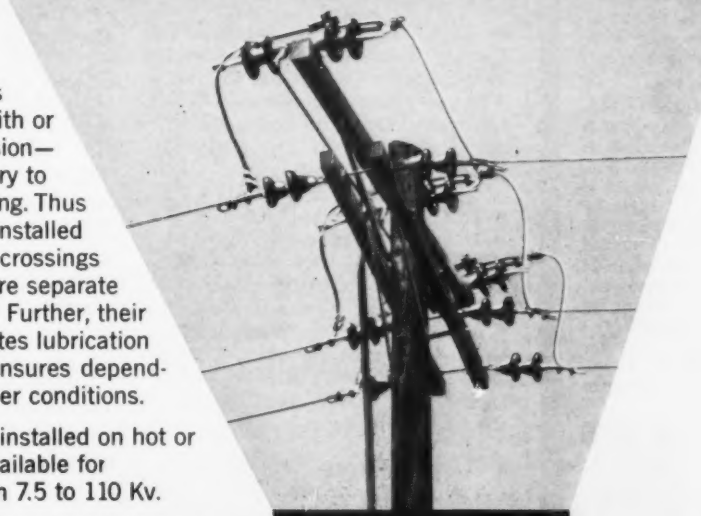
Appointment of D. M. Pritchett to the newly created position of assistant to the president of California-Pacific Utilities Co. was announced by President E. K. Albert. Pritchett has been with the company since June 1941 and has been personnel director since August 1947. With headquarters in San Francisco, he will continue in charge of personnel activities and work on special assignments for the president.

► **A. J. G. Leighton,** former program control engineer for British Columbia Power Commission, has been named director of engineering. **P. J. Croft** is planning director.

► **A. L. Maxwell** has been appointed manager of taxes for Southern California Edison Co. to succeed **Smith B. Davis,** who was recently elected vice-president and comptroller of the company's subsidiary, Associated Southern Investment Co.

INSTALL KPF SWITCHES WITH OR WITHOUT LINE TENSION!





KPF air break switches operate equally well with or without conductor tension—tension is not necessary to their smooth functioning. Thus KPF switches may be installed on angle poles, major crossings or other locations where separate deadends are desired. Further, their simple design eliminates lubrication or maintenance, and insures dependability under all weather conditions.

KPF switches may be installed on hot or dead lines, and are available for common voltages from 7.5 to 110 Kv.

Test KPF switches with an installation on your own system. Inquire now!

KPF ELECTRIC COMPANY

KPF
AIR BREAK SWITCHES
Standard for half a century

P.O. Box 1257W
Stockton, California
HOward 4-8381

8871

Here's why you get superior performance FROM FURNAS CONTROLS

. . . Furnas Magnetic Starters feature advanced design for superior performance and longer life. Standardized design reduces parts inventory and provides quick and easy field modification.

- Dual Voltage 110-220 or 220-440 Volt Coils reconnectable on the job. Magnet features just one moving part.
- Non-tracking Contact Block is impact resistant. Completely visible and front removable silver-cadmium oxide contacts.
- Trip-free Thermal Overload Relays—manual or automatic reset. Third overload relay kit can be added in the field.
- Extra Switchlet interlocks for additional pilot circuits (up to 4) may be added to all starter sizes 0-4.

Contactor

Drum Control

Write today for FREE Color Bulletin 14-B1, Furnas Electric Company, 1082 McKee St., Batavia, Illinois A76

FURNAS ELECTRIC COMPANY
BATAVIA, ILLINOIS

Neill Advanced By Montana Power

Appointment of R. A. Neill of Butte as assistant vice-president of the Montana Power Co. was announced by President John E. Corette.

In his new position Neill will be an executive official of the company, assisting the officers in their functions and carrying on independent assignments, Corette said. For the past two years Neill has been in charge of the company's employee information program and, since his employment by the utility in 1956, has been research consultant. He will retain those duties.

Prior to joining Montana Power, Neill was executive secretary of the Montana Taxpayers Assn. which he joined in 1946. Before that he was associated with the Montana Board of Equalization.

► **Don Thompson,** city light superintendent at Ellensburg, Wash., has resigned, effective immediately, because of illness. **John Robertson,** chief engineer, will be in charge of the operation until a successor is named, according to Ben Mead, city manager. Thompson served in the post for more than four years and was in charge of changing the distribution system over from low voltage to high voltage.

► **L. J. Kerrick,** St. Maries, Idaho, district manager of the Washington Water Power Co., retired on Jan. 1. The new manager is **Norman C. Lee,** formerly division office superintendent, Palouse division, Pullman, Wash.

► **Robert Aschenbrenner** of the Bureau of Reclamation engineering staff at Boise, Idaho, has been named to the newly created position of power engineer for the Grant County PUD at Ephrata, Wash. He will be in charge of power production at Priest Rapids and Wanapum Dams, now under construction on the Columbia River.

► A luncheon was held by Electric Corp. of Calif. on Dec. 29 to honor **Charles Kunkel** who has retired from the company after 33 years of service. Kunkel, a sales engineer, was presented with a tape recording of best wishes from customers and manufacturers' representatives.

► **Howard Arnett,** vice-president of Portland General Electric Co., is new chairman of the industries committee of the Portland Chamber of Commerce. The committee is considered one of the key committees of the Portland Chamber.

► **Vincent P. Slatt,** who has been chief engineer for Inland Power & Light Co., Spokane, for the past 11 years, has been named manager of the REA cooperative, succeeding **T. C. Waller,** who resigned. In the new position, Slatt will assume some of the responsibilities of chief engineer, but most of his former duties will be handled by **Glen Richard Burch,** assistant engineer.

Slatt

► **Norman Holmdahl,** former chief electrical engineer at Grand Coulee Dam, died at a Spokane hospital Dec. 7. He was the hero of the 1952 flooding incident at Grand Coulee. His quick action was credited with helping to prevent further damage when the outer intake tubes were accidentally left open at the project at the same time the lower outlet gates were closed. Water drawn through from the upstream side of the dam was blocked from release and swirled through the inner tunnels of the structure. Some water reached the generating units and some were knocked out of service for a time. Mr. Holmdahl was one of several who risked their lives to wade through the tunnels to get to equipment to open the outlet gates and release the internal pressure that was threatening the project.

SALES ENGINEER

Major aluminum and cable producer seeking experienced engineer to sell aluminum electrical products in Southern Calif. area. Must be aggressive, industrious and capable pioneering new products to utilities and contractors. Age under 40. Engineering degree or equivalent. Car furnished. Excellent company benefits. Hqs. Los Angeles. Co. personnel are aware of this ad.

Qualified persons are invited to submit detailed resumes in confidence to Box 309, Electrical West, 68 Post St., San Francisco 4, Calif.

WIN A HAWAIIAN HOLIDAY

in the **HOTPOINT**
MEDALLION HOME PROGRAM

MEDALLION HOME ® LIVE BETTER ELECTRICALLY

A fun-filled trip to America's Paradise in the Pacific awaits power supplier representatives in the Hotpoint Medallion Home Program. This dynamic advertising and merchandising program is power-packed to help you turn more builders into Medallion Home builders.

Hotpoint backs up this tremendous load-building program with the quality appliances the public prefers plus .... 1960's greatest boost to all-electric living...

NEW
HOTPOINT ELECTRIC BASEBOARD HEATING
WITH CALROD® HEATING UNITS

Hotpoint offers the load-building benefits of electric heating – clean, safe, comfortable, convenient, economical – plus the proven performance of famous Calrod heating units. Call your Hotpoint distributor today for complete details on new Electric Baseboard Heating, the Hotpoint Medallion Home Program, and your Hawaiian Holiday.

Hotpoint

A Division of General Electric Company, Chicago 44, Illinois

ELECTRIC RANGES • REFRIGERATORS • AUTOMATIC WASHERS • CLOTHES DRYERS • CUSTOMLINE® • DISHWASHERS
DISPOSALLS® • WATER HEATERS • FOOD FREEZERS • AIR CONDITIONERS • ELECTRIC BASEBOARD HEATING

For phone number of closest representative see advertising index in back of book.

NEW •

*Pat. Pending on Entire Method and Apparatus

Jet Line Cylinder

eliminates snaking in ½" and ¾" conduit!

The new Jet Line Cylinder makes short work of wiring ½" and ¾" conduit . . . saves up to 70% of wire-pulling costs . . . can pay for itself on one or two jobs!

Now you can lay a line through one . . . ten . . . even fifty conduits in minutes, regardless of lengths, bends, or loose obstructions! Place a line package in the conduit; secure the free end of the line. Butt the Cylinder seal-off assembly to the end of the conduit and activate the valve . . . pressure, from the expansion of a harmless gas, travels the lightweight line package through the conduit in a split second! The strong nylon line, laid by the package, is used to draw polyethylene rope, then wire, through the conduit in minutes!

The Jet Line Cylinder is safe, no inflammable substances or explosives are used, and nylon line and polyethylene rope are non-conductors.

Kit contains: Cylinder, valve, pressure regulator, valve operating mechanism, and full pressure attachment with variable head. Cylinder refillable; spare cylinders available. Order a Jet Line Cylinder Kit now . . . forget fish tape forever!

OWN THE COMPLETE JET LINE SYSTEM *

Jet Line Cylinder for ½" and ¾" Conduit • Jet Line Gun for Conduit 1" or larger

Be prepared for all conduit wiring jobs, carry the *complete* Jet Line System . . . Cylinder and Gun. SAFE, QUICK, SURE, the Jet Line System, invented by experienced electricians, has been thoroughly job tested. Compare its speed and simplicity with long hours spent in snaking . . . count the time you save in dollars!

For complete information and prices, write your distributor or

Jet Line Gun Company

615 FUGATE AVENUE, CHARLOTTE 5, N. C.

4431

Manufacturers—Distributors

Baker

Rowley

Graybar Changes

George M. Baker was appointed Graybar manager at Oakland, Calif., replacing Mark L. Wilkins, who leaves after 37 years with the company, 25 of them as Oakland manager.

Replacing Baker as manager of lamp and lighting sales for the San Francisco district is W. C. Rowley, who was transferred from Salt Lake City, where he held the same post. Rowley has been with Graybar since 1937 and was in Oakland previously.

William C. Poulson will succeed him at Salt Lake.

Rome Appoints Michalke

Walter E. Michalke has been named sales manager for northern California and Nevada of the Rome Cable Division of Aluminum Co. of America. He succeeds the former district manager of Rome Cable Corp., **C. H. Kaufman,** who has retired.

Michalke

A native of Harlingen, Tex., and a veteran of World War II, Michalke was graduated from the University of Texas with a degree in electrical engineering. He joined Alcoa in 1950 and was assigned to the Charlotte, N. C., sales office until 1957 when he was transferred to Alcoa's San Francisco district office. He is a member of AIEE, Engineers Club of San Francisco and Electric Club of San Francisco.

► Five Western cities—Los Angeles, Santa Clara, Calif., San Francisco, Portland and Seattle—are on the itinerary for **Federal Pacific Electric Co.'s "Power Parade."** The eight-month tour will take an exhibit of electrical control, distribution and

For phone number of closest representative see advertising index in back of book.

power equipment to more than 30 cities across the nation. Among those being invited to attend are consulting engineers, architects, builders, electrical inspectors, distributors and contractors and utility company representatives.

Tells '60 Plans

To bring its independent distributors and its own organization up to date on product developments and applications, Westinghouse Electric Corp. held a series of meetings in the West last month. Some 450 people from eight states, including Alaska, attended presentations at Los Angeles, Phoenix, Palo Alto, San Francisco and Seattle.

J. J. Herter, Pittsburgh, manager of the industrial application section, Agency and Construction department, conducted the programs, built around the theme, "Career Year of 1960." Other speakers were W. L. Trudgian, regional A&C manager, San Francisco, and R. B. Roberts, regional sales promotion manager.

Skits, slides and movies were used for the presentation, which included a summary of sales support programs for 1960. A feature was the preview of Westinghouse plans for coverage of the 1960 political campaigns, with actual footage from the 1956 conventions.

The year promises to be a fantastic one for sales of electric apparatus, distributors were told, and new approaches, new concepts and new programs and new developments will make 1960 their career year.

► Appointment of **Charles T. Haist** as Western regional manager for the General Electric Co.'s computer department at Phoenix was announced by **L. R. Sheeley**, department manager of sales. Haist will retain headquarters at the company's San Francisco office, 235 Montgomery St. He was formerly Western regional sales manager for G-E's radio and television broadcast equipment.

Haist

► **Ross K. Patterson** has been appointed manager of the Northwest District for the Daystrom-Weston Sales Division of Daystrom Inc. His territory will include Washington and Oregon. He heads up a new sales office in Seattle.

PROTECTION AND BEAUTY, TOO

There's No Other Paint Like Subox

... Because Subox is the only paint in the United States made with chemically-active lead-suboxide. Unlike the pigments of inert paints, lead-suboxide changes chemically after drying to form an increasingly tough protective coating — rust inhibitive, acid and alkali resistant. Subox effectively safeguards metal surfaces: buildings, transformers, fences.

... Because Subox paint comes in modern, bright pastel shades, as well as darker colors, painting for normal maintenance can produce attractive decoration appropriate for neighborhood surroundings.

... Because Subox covers with a dense, impervious film, a single coat often is sufficient. Subox is both economical and good looking.

Write today for technical literature and color card.

SUBOX PAINTS

Subox Inc.

The Ambler Co. Denver, Colo.
R. E. Cunningham & Sons Los Angeles, Calif.
Wrathall & Krusi San Francisco, Calif.
Wm. J. Cottrell & Assoc. Portland, Ore.
Plant and Office—Hackensack, N.J.

Decision Reached in Patent Suit

On Jan. 6, the United States District Court for the Northern District of Ohio, at Cleveland, announced its decision in the action brought by Preformed Line Products Co. against the Fanner Mfg. Co. Judge Charles J. McNamee, who tried the case, held the dead end patient (U.S. Patent No. 2,761,273) valid and infringed by Fanner but denied any damages or injunction to Preformed until certain commercial practices which he found to be "misuse" of the patent are shown not to have been "misuse" or to have been terminated. The "short pitch" armor rod patent (U.S. Patent No. 2,609,653) was found invalid and not infringed by Fanner. Preformed's claim of unfair competition was dismissed for lack of jurisdiction, without prejudice to the right to bring such an action in a court of competent jurisdiction. Fanner's counterclaim for damages was also dismissed.

► Appointment of **Industrial Engineering & Equipment Co.,** Los Angeles, Calif., and **Western Power Products,** Portland, Ore., as Western manufacturer's representatives for **Texoma Enterprises** Inc., Sherman, Tex., has been announced by **Ben Blackburn,** executive vice-president. Industrial Engineering & Equipment Co. will cover California, Arizona and Nevada; Western Power Products, Washington and parts of Montana and Idaho.

► **Erling Ringstad,** manager of Copperweld Steel International Co. since its inception in 1944, was appointed its executive vice-president effective Jan. 1. He joined Copperweld in the sales department in 1936 and before that was with Electric Bond & Share in Argentina and New York.

► **James L. Robb** has been made president of Superior Cable Corp., succeeding **R. Walker Geitner,** now chairman of the board. An electrical engineer, Robb has been with the company since its inception and before his advancement was executive vice-president.

► Prescolite Mfg. Corp., Berkeley, Calif., has named **Stan Heywood** to the newly created post of national marketing director. He will set up regional and national sales meetings with architectural and engineering groups as well as with distributors and contractors as part of a new nation-wide merchandising program. In addition, he will act as the company's public relations representative.

► **Robert Dye,** a field applications engineer, is being added to the Los Angeles staff of I-T-E Circuit Breaker Co. Staff is being increased so that salesmen can concentrate on one of four fields—utility, industrial, contractor and resale. Dye, who will work in the resale end, has been through the training program at the I-T-E factory in Philadelphia. He has been with the company two years.

► **J. F. Kallmayer** has been appointed assistant product sales manager for Kaiser Aluminum & Chemical Sales. He joined the organization in the St. Louis sales district and comes to his new post from Chicago.

► Sierra Electronic Corp. has appointed **H. D. Farnsworth** as manager of product planning and **Sanford K. Ashby** as sales engineer. Farnsworth was with Stromberg-Carlson in Los Angeles and earlier in engineering supervisory capacities with Philco. Ashby was a partner in Ashby Associates, manufacturers' representative.

► **Jack H. Stumph,** 1000 Fourth Ave., South, Seattle, has been appointed underfloor duct representative for The National Supply Co. in Oregon, Washington, Montana and northern Idaho. He has been conduit representative for the company in the area for several years and will continue in that capacity.

► **Garlan Morse** has been named vice-president and general manager of Sylvania Lighting Products Inc. in Salem, Mass. Formerly regional vice-president with headquarters in San Francisco, Morse will take charge of the firm's engineering, production and sales. **Fred Heintz,** former regional manager for Sylvania sales in Chicago, will replace Morse in San Francisco.

► **Everett F. Anderson** has joined **Clark Controller** Co. in Los Angeles as district engineer. He was most recently in the application engineering and commercial engineering departments at the company's plant in Cleveland.

► **Nourse Equipment** Co. has moved into new and larger quarters at 2300 Fourth St., Berkeley 10, Calif. The company represents James G. Biddle, Empire Corp., Harmath Electric & Mfg. Co. and Madison Electric Products Inc.

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Oakland:	1911 Union St. GLencourt 1-5451
Oceanside:	805 N. Tremont St SAratoga 2-2141
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San Diego:	720 State St. BEImont 3-1361
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IDAHO

Boise:	1325 Idaho St. BOise 3-2594

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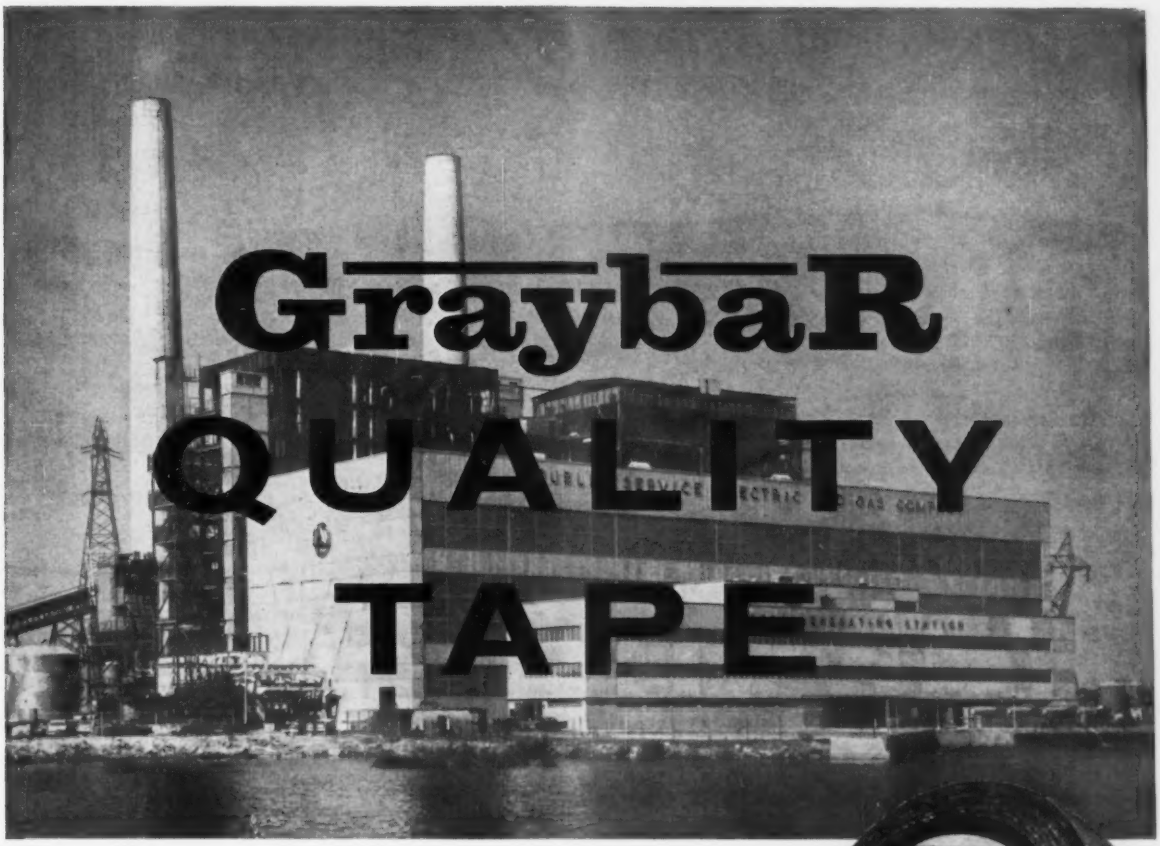

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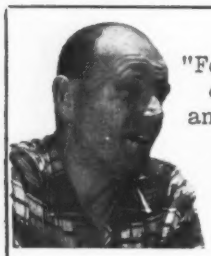

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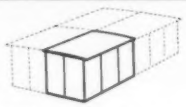

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Market Development

PGE Realigns Sales Staff

Reorganization of Portland General Electric Co.'s sales department has brought shifts in responsibilities and assignments aimed at separating competitive (new customer) selling from strictly promotional sales effort.

The reorganization is coupled with an intensified sales training program, according to Carl Brissenden, PGE general sales manager. The new assignments:

W. L. (Bill) Tait has been appointed manager, residential sales promotion, covering residential sales promotion and home service activities. This will include appliance sales, the Medallion Home program and the group education program.

Nick G. Mason is manager, commercial and industrial sales promotion. He will coordinate promotional activities in commercial cooking, general nonresidential air conditioning, heating and illumination.

C. W. Jarrett becomes manager of public services. He will be in charge of illumination, heating and air conditioning in schools and of all street lighting.

J. T. (Jack) Cottingham has been assigned to the commercial sales section and during the absence of L. J. (Jerry) Collins, who is ill, will be acting manager of that section.

In addition to Portland Division responsibilities Tait, Mason and Jarrett will be in charge of system promotional planning and training in their assigned areas.

► Appointment of **Fred W. Curle** as manager of dealer sales for the Southern California District of General Electric Co.'s Major Appliance Division was announced by **William B. Frogue,** district manager. Curle is transferring to Los Angeles from G-E's Denver district, where he has been manager of dealer sales since 1957. Prior to this, he was manager of the appliance and home products department of the B. K. Sweeney

Curle

Co., at that time the independent distributor in Denver for G-E major appliances. George A. Lloyd, who previously held the post, will remain with the company acting in an advisory capacity to Curle.

► **Francis H. Williams** was appointed promotional manager of Hawaiian Electric Co. on retirement of Charles E. Nolan, Dec. 31. Williams joined the company in 1952 as sales counselor and was made assistant promotional manager last August. He went to HECO from the Hilo Electric Light Co. where he was commercial manager. Born in New York, he was stationed in Hawaii during World War II and after the war returned to the island to make his home.

Williams

Erma Boyen Wins McCall Award

Erma Meeks Boyen, home service director of Hawaiian Electric Co., received her third McCall award during the Electrical Women's Round Table convention in Chicago last month. Presentation was made by McCall's Magazine, sponsor of the Laura McCall Awards for Home Service Achievement.

Mrs. Boyen received the 1959 award for a special recipe booklet commemorating Hawaiian statehood. She won previously in 1940 and in 1957.

► Plan to Live Better Electrically in Your Next Kitchen-Laundry is the title of the latest in **Hotpoint's consumer booklets.** Attractively illustrated in color, the booklet is designed to take many of the headaches out of kitchen planning. Build your kitchen center by center; it pays to measure; plan your kitchen dreams on the drawing board, check your plan, are a few of the section headings.

► Bill Albert, sales manager for the **John E. Amberg Co.,** Seattle Admiral distributor, reports success with a campaign offering Rose Bowl tickets as incentive. Customers purchasing any Admiral product during December were eligible for the tickets. Each participating dealer awarded one of his customers the all-expense trip at special drawings.

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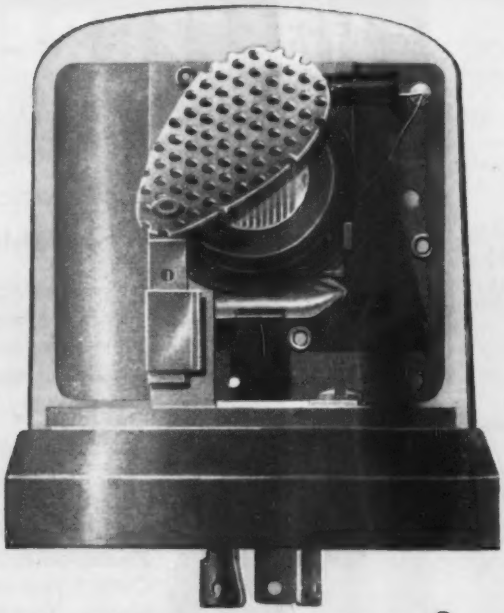

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